FACTORY

MANAGEMENT AND MAINTENANCE

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MAY 1943

LUBRICANTS Using Them Effectively

Recent Changes in MANPOWER

This BYERS WROUGHT IRON Pipe Coil helps a Baltimore Plant to save fuel oil

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He turned the job over to John H. Zink, president of Heat and Power Corporation. Mr. Zink, because of his knowledge of the corrosion resistance, bendability and excellent welding qualities of Byers Wrought Iron, used it in fabricating the pipe coil illustrated. It was cold bent around a short piece of 14-inch OD pipe, and the joints welded. The coil was then installed in a tank shell, through which the Diesel exhaust passed. Connected to the regular heating boiler, the coil serves as a preheater and auxiliary. Experience to date indicates that with its help, the heating load can be carried on the fuel oil rationing allotment. The last report was, "Heater coil working out to entire satisfaction of all concerned."

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If you have any problem in connection with new or old equipment or services, where severe corrosion or vibration that might cause fatigue are present, don't sele materials without giving careh consideration to wrought iron. has been used for practically ever application in the average plan and so its performance is not matter of guess work, but of e gineering record. These record received from practical enginee like yourself, are a big help writing sound specifications, a are at your service; just write, ou lining your particular proble Ask, too, for a copy of our technic bulletin, "101 Uses for Wroug Iron," which should give you som valuable tips.

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CORROSION costs you more than WROUGHT IRON

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ELECTRIC FURNACE ALLOY STEELS · OPEN HEARTH ALLOY STEELS
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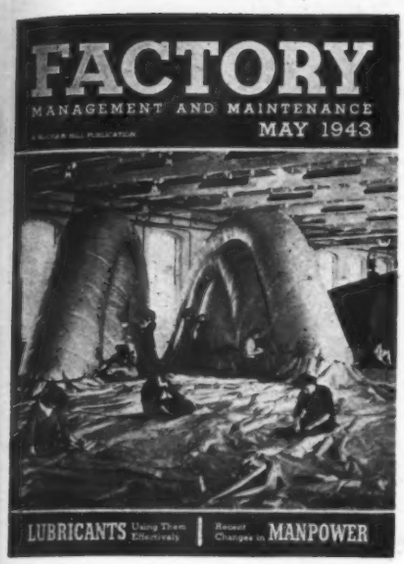

Air-filled fins of barrage balloons undergo inspection at United States Rubber Company's Woonsocket, R. I., plant. These are the English-type balloons that so successfully helped save England's war industries during the blitz. Rigidity of the fins (stabilizers) is determined by flying conditions. On a calm day they flop like elephants' ears. Kodachrome by courtesy of United States Rubber Company.

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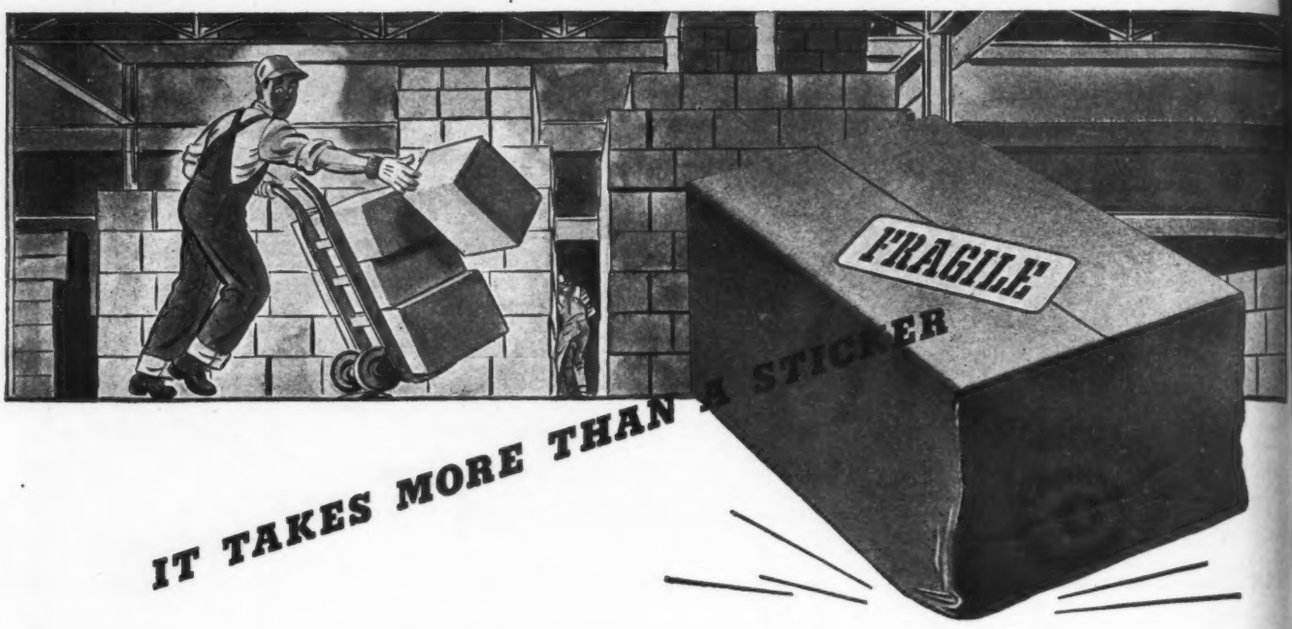

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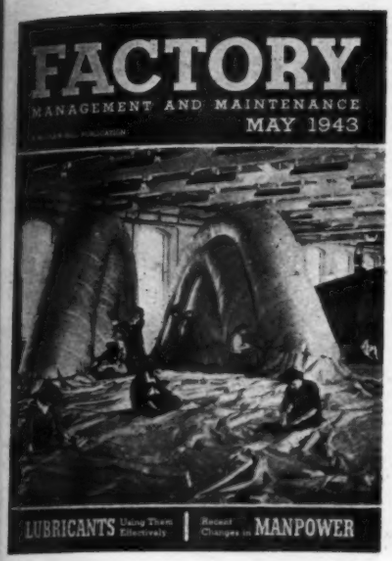

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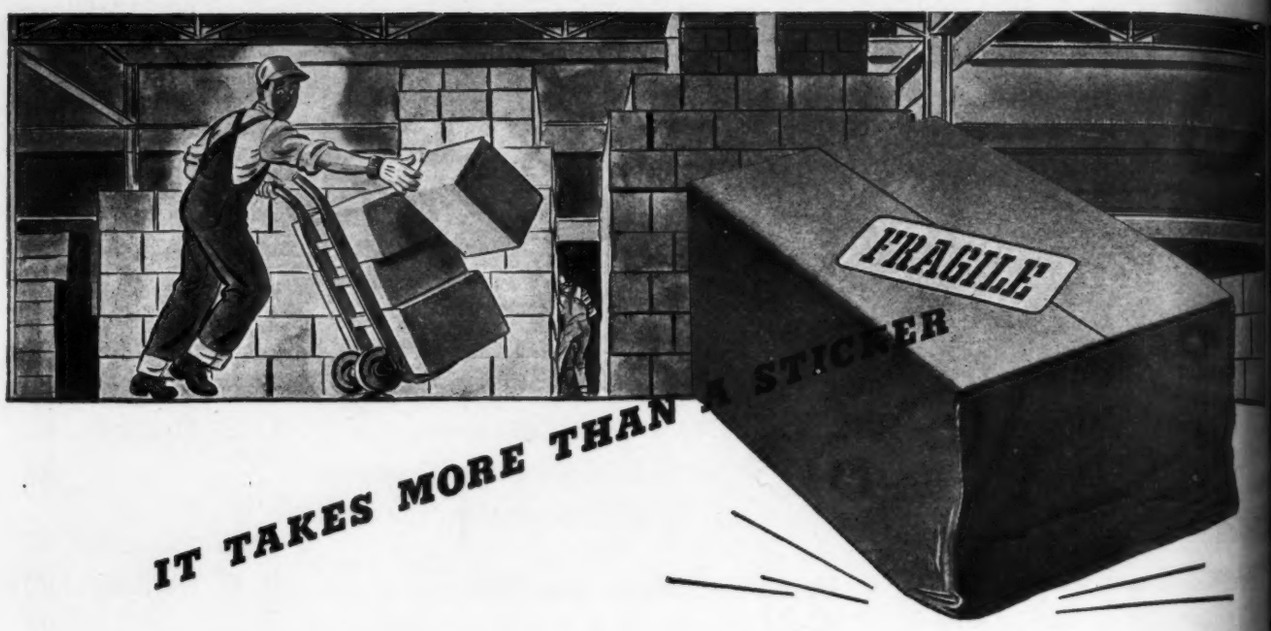

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TRANSPORTATION—a vital war factor

The effectiveness of our armed forces and civilians alike depends on the efficiency of our transportation

As the battle of Tunisia entered its final phases, with the British and American forces joining hands to crowd Rommel into his last fox hole, Hitler and Mussolini held their twelfth war-time meeting.

One important purpose of this meeting, according to the Berlin radio, was the study of a specially prepared "Survey of Continental Reserves". Topping this list of resources is the item of transportation.

Hitler has a great many headaches these days but, according to no less an authority than the Reich Ministry of Economics, "the central problem of the whole German war effort is transportation". It is, in fact, the Achilles' heel of Germany's War Machine.

The Nazis have become soberly conscious of its crucial importance and Mr. Hitler must wince when he recalls the gigantic miscalculations which led him to neglect his railways.

He counted on a short war, not a long wear-and-tear war and Germany's transportation crisis is getting more critical by the hour. It will play a vital part in its defeat.

This is a war of movement—on land, on sea and in the air. Russia's 2,000 mile battleline, R.A.F.'s 700 mile bombing raids, General Montgomery's 1,500 mile advance last November and the vast area that constitutes the theatre of war in the Pacific make this fairly obvious.

Peace will come when one side gets control over the world's supply of fuel, oil and rubber, for on these three critical materials depend all the vehicles of war—as well as of peace.

An army used to travel on its stomach. Today it travels on its fuel tank.

On the home front, transportation is no less vital. Here it is essential in getting the war workers, their raw materials and their products, to and from the mines, mills and factories that supply our armed forces and those of our Allies. Transportation is a major factor in the nation's ability to out-produce its enemies. Every known method, every type of vehicle becomes essential, for no single group of carriers, freight or passenger, can meet all our needs.

The railroads opened the vast resources of our nation and continue to be the backbone of our transportation system. Today they are doing the greatest job in their history. They are hauling more tons of freight more miles than ever before—33% more than in 1941 and 55% more than in 1918, peak year of the first World War. They are carrying more passengers more miles than ever before—80% more than in 1941 and 24% more than in 1918. They are getting more work out of each car, each engine, and each mile of track than ever before. Private operation of railroads is proving far more effective and efficient in this war than did government operation in the last war.

This is the eleventh of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

In contrast to Hitler's Germany, the managers of the American railroads have not neglected their plant except where government priorities forced them to do so. They are turning in an unprecedented performance despite the long starvation period to which they were subjected. During the first World War the total investment in the American railroad plant was about $18,600,000,000. Since then $12,000,000,000 have been spent on improvements and after deductions for scrapped facilities the net increase has been $8,000,000,000. Since the present war in Europe began the railroads have invested about $1,650,000,000 in further improvements, many of them to meet special war needs.

Convincing evidence of the railroads' flexibility in meeting the special needs of all-out war is their performance in coping with the movement of oil to the East Coast. In January 1942, one month following Pearl Harbor, the railroads delivered to the East Coast by tank car less than 100,000 barrels daily. By December they had stepped this up to more than 740,000 barrels and during the week ended April 3, 1943 they

averaged more than 900,000 barrels per day. By the end of this year they are shooting for the goal of one million barrels a day.

Unlike Germany we have not attempted to control the development and growth of motor transportation according to the "intuitions" of one man but have wisely left it in the hands of experienced competition. That is how our highway transportation system came into being. Growing public acceptance has made it an essential part of our national economy.

The motor vehicle, its limitations set only by the improved highway and the supply of fuel and rubber, has developed to undreamed of proportions. Up to a year ago private automobiles consistently moved more people more miles than *all public carriers combined.* Buses have become an accepted means of mass transportation. Local electric and interurban railways in many cases were converted to bus lines and trucks took over the local freight services. Under these improved operating conditions traffic volume increased. When the war in the Pacific made it necessary for us to conserve our supply of rubber and the U-boat depredations in the Atlantic throttled the flow of gasoline to the eastern seaboard, our motor transport was forced to grapple with the toughest problem that ever had confronted it since it became so vital a factor in the every day transportation.

The "share-the-ride" idea recognizes the need of conserving gas, oil and rubber. This particularly applies to buses, for wherever groups can be assembled for a common destination, buses can be used most effectively. The intercity bus performs for the rural areas the same service that the local bus renders for the residential areas of our cities.

Reorganization of railroad schedules, adaptation of motor transport, rearrangement of working hours, all have contributed to provide a flexible transportation service for men and materials to meet the critical needs of the war effort. Twenty thousand intercity buses are handling 635 million passengers a year which is 69 per cent more than in 1941. The fact that these buses carry a relatively larger percentage of the total coach passenger business than their seating capacity would indicate suggests that here, too, we are getting a more efficient use of these vehicles in terms of passenger loads carried. It is fortunate to note that the geographic location of most intercity bus lines does not coincide with that of the railroads but rather supplements it.

The contribution which the urban transport industry is making to the war effort becomes apparent when we consider that buses, trolley buses and street cars today carry passengers at a rate which promises to exceed the impressive total of 21 billions, as compared with 18 billions in 1942 and an average of 13½ billions for the period 1936 to 1941. And this the industry is accomplishing with a minimum of added equipment and despite a serious drain on its manpower.

The truck lines, too, are setting all-time records. They have rearranged their schedules, eliminated circuitous routes and coordinated their services with thos of other carriers. As this is written, contract trucke with the cooperation of the Office of Defense Tran portation are trying to eliminate the empty return tri

The transportation industry as a whole is face t face with the biggest job in its history. Increasing tra fic loads, with little if any new equipment, difficulty i obtaining essential maintenance materials and a grow ing shortage of manpower, combine to make it tha While federal authorities, acting through the Office o Defense Transportation, took prompt cognizance o this condition, froze equipment and otherwise acte to conserve the vehicles then in service, it was not pos sible to add sufficient vehicles to keep pace with the increased traffic demand. However, the O.D.T. did lend impetus to the movement for staggering hours o work thereby spreading the peak loads and thus in creasing the carrying power of existing fleets of vehicle in city service.

As we review the problems involved in meeting ou transportation needs it is evident that we cannot de pend upon new equipment alone for their solution Lend-Lease is taking a considerable share of our muc needed output of transportation equipment. The in mediate job is up to the rank and file of the transport tion industries. It is up to their resourcefulness an devotion to their job. The operating men out on th road, the men in the shops who keep the equipme going, who make the most of the metals and oth materials they can have, who salvage, conserve an economize . . . these are the men who must bear th burden of our war load.

Theirs is a dramatic story, a story of cooperation an coordination . . . of ever increasing capacity on a sho string allowance of new equipment.

For this is a war of movement. According to Josep B. Eastman, Director of Defense Transportation, bot the passenger and the freight traffic on the railroad is to a large extent war traffic – the transportation o troops and civilians on war business, the movement o food, raw materials and finished products required fo the prosecution of the war. As Mr. Eastman put i delayed arrival of troops at embarkation ports, delaye delivery of vital war materials could even conceivabl mean the loss of men at the fighting front. And wha Director Eastman says of the railroads applies to a forms of transportation. Transportation by bus, b street car, by truck, by train, by ship and by plane . . all play a vital part in the achievement of victory . . on the home front and on the fighting front whic relies upon it.

President, McGraw-Hill Publishing Company, In

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L · C · MORROW · EDITOR

The Post-War Cost Objective

On all sides industry is being asked to plan for the post-war period. An encouraging number of organizations have begun to do so. As the plans come to light, though, they seem to be concerned almost entirely with what is to be made, what materials are to be used, and what will be the size of the market. All necessary and important, but—

Rarely is anything heard about plans for *production cost*. Yet, unless war, plus large-scale fiscal activities, have given us a new kind of national economy, it is *production cost* that will determine the extent to which goods and services can be made available and the number of people who will be able to enjoy them.

It is fairly well agreed by economists who make a study of such things, that there will be approximately 56,000,000 persons seeking gainful employment after the war—say two years after, to allow some time for cessation of war work and demobilization of the armed forces.

Paul Hoffman, of Studebaker, and chairman of the Committee for Economic Development, has estimated $100,000,000,000 as the gross output in goods and services in 1940 when gainful employment was 46,000,000. To find productive employment for the 56,000,000, he says, we shall have to turn out more than $140,000,000,000 worth of goods and services.

No doubt that is true—in 1940 dollars. And the amount may be a whole lot higher than that in terms of some new dollar. But it *could be* a whole lot less in still another dollar. For the dollar, to be measured truthfully, must be gaged in terms of what it will buy, and no other way.

It has been plentifully demonstrated that the American people will pay almost any price in time of national emergency, when they foot the bills in the form of government spending. But it has been equally well demonstrated that as individuals they buy en masse only when prices are attractively low. And how they do buy then! —as in the cases of automobiles and refrigerators.

The spark plug of the mass-production, mass-consumption engine is low-production cost. The cycle is well known: Low cost of production, low selling price, great distribution. Let the cycle work out with enough goods and services and the people of the nation have a high standard of living, with jobs for all.

The conclusions seem inescapable that during this period of production: (1) We should be planning *how to make* as well as what to make and where to sell it; (2) our how-to-make plans should incorporate the results of all we can learn from our forced study of materials and processes; (3) we should never lose sight of what has made America strong, namely industry's ability always to achieve more output of its products with less input of materials, power, and human energy—and consequent production of more and more goods and services for more and more people.

L C Morrow

The Changing Manpower Problem

1 UTILIZATION
2 DEVELOPMENTS
3 FORECAST

A bewildering avalanche of manpower news has descended upon the industrial reader within the past month. Voluminous, confusing, and often contradictory, the official statements and press reports are enough to baffle a full-time student of the problem.

Yet few management men can give a large part of their time to any single phase of today's swift-changing industrial scene without neglecting something equally important.

With the busy management man in mind, *Factory* presents in this and the six following pages a highlight analysis of the manpower picture. Items of principal interest are segregated under: (1) Utilization, (2) Developments, (3) Forecast.

No attempt is made here to cover spot news details. In this report, the editors of *Factory* have sought instead to strip the subject to significant essentials. This report, in fact, presupposes a certain acquaintance on the reader's part with events themselves. It is for the *meaning to management* of these events that *Factory* has studiously searched, after consultation with principal officials of government and industry in Washington and in the field. The following interpretations represent a composite of informed points of view, including some facts and opinions obtained off the record. They are thus occasionally at variance with official announcements of policy.

Utilization

OF GREAT INTEREST (and some concern) to management was news of a new Bureau of Utilization within the War Manpower Commission.

That the new unit had no coercive designs on management was explained with some care by Chairman Paul V. McNutt of WMC when he announced its creation last February 12 at the Chicago meeting of the American Management Association.

Certain press reports, however, took a startling tone. Mention of a staff of "utilization consultants" seemed somehow to suggest an awesome inspectorate along totalitarian lines—a corps of bureaucratic "Mr. Fixit's" poking unbidden into every management's every affair.

Enough time has passed since then, however, to make safe the assertion that the new Bureau's aims are neither grandiose nor ulterior. Cautiously brought along, the unit is still largely, truth to tell, "on paper" and the activities of its relatively small staff are largely exploratory.

The Bureau has already demonstrated, however, that there are tangible ways in which it can be helpful to management on a cooperative basis:

1. The Bureau's consultants can "sell" management on the need for a more complete manpower program within the plant. This, in essence, means simply a personnel administration program geared to war conditions.

2. The Bureau can help management to obtain the services, on a temporary loan basis, of first-flight personnel men from other plants to assist in setting up manpower programs.

3. The Bureau itself can assist in the preparation of manning tables and replacement schedules, in occupational and worker analysis, and in employee selection.

4. The Bureau's representatives will "know their way around the government" and will thus be able to help management in getting the assistance of other agencies, within and without WMC, in recruitment, training, and perhaps even in such relatively remote problems as housing, transportation, and priorities.

Heading WMC's Bureau of Manpower Utilization is Dr. Frank H. Sparks who came from presidency of Wabash College. Primarily a manufacturer, Sparks is co-founder of the Noblitt-Sparks Industries

5. The Bureau's consultants, a good many of whom will be part-time volunteers from active industrial jobs, will "know their way around industry." As they progress they will become increasingly familiar with common problems and solutions, and will thus be able to circulate useful information on a farly wide scale.

In his Chicago announcement, McNutt ranked the Bureau equal to the other chief branches of WMC—Training, Placement, and Selective Service—under the operating supervision of Lawrence A. Appley, WMC Executive Director. At the head of the Bureau itself was placed Dr. Frank H. Sparks, who came from the presidency of Wabash College. Not primarily an academician, Sparks was first a manufacturer. As co-founder of the Noblitt-Sparks Industries of Indianapolis, he brings to his task a practical grasp of management problems as well as the administrative ability that his more recent college connection suggests. A practical idealist, his personality alone is a guarantee that any agency under his direction will refrain from dictatorial tactics.

As a further reassurance, it should be pointed out that the Bureau's staff of consultants (now less than half complete) will number at its maximum only about 200. And it is obvious that 200 men could hardly hope to terrorize thousands of managements, even if such were their aim.

To the Bureau's personnel has also been added the rather extensive staff of the Division of Occupational Analysis which was a division of the United States Employment Service. Headed by C. L. Shartle, who was notably identified with the development of the Manning Table Plan, this unit has 400 trained analysts in the field, many of whom had an active hand in the compilation of the *Dictionary of Occupational Titles*. They have also originated a number of occupational selection tests, widely used by the Army and Navy in measuring skills and aptitudes, and they have compiled data on "job families" of related skills, useful in the execution of transfers. Finally they are equipped to advise employers on the best methods of inducting and utilizing women and handicapped workers.

Perhaps the foremost service of these analysts, however, may prove to be the aid they can render in the preparation and review of manning tables and replacement schedules. As a branch of the Bureau of Utilization, the Shartle group is now known as the Division of Occupational Analysis and Manning Tables. It is one of the new Bureau's four departments, the others being the Divisions of: (1) Industrial Consultants, (2) Government Agencies, (3) Special Industries.

Several questions remain to be asked about the new Bureau, to which time alone, in all probability, can supply accurate answers. Chief of these, and a logical one from the management point of view, is this:

Does the Bureau propose to analyze plant methods and advise management specifically on every phase of personnel administration and management practice? After all, the phrase, "manpower utilization," would, if broadly interpreted, include the whole wide world of management procedure. For a plant could hardly be said to be utilizing its manpower fully unless it were well-nigh letter perfect, not only in the complex realm of personnel procedure (including selection, orientation, job evaluation, wage and salary administration, training, collective bargaining, morale building, promotion and upgrading, and health and safety work, to name only a few functions) but also in the broad field of

management (including time and motion study, plant layout, cost and production control, and scheduling, handling, and even purchasing materials).

Chairman McNutt's Chicago speech gave the impression that the Bureau would indeed address itself to most, if not all, of these matters. In fact, McNutt went further and included in his list of problems confronting the Bureau such things as labor "hoarding" by management and restrictive practices on the part of labor—debatable evils which might require months of the most scientific investigation in the individual plant.

Further still, "absenteeism" and turnover came in for due mention. These involve out-of-plant complications (local wage scales, housing, transportation, child care) which often lie beyond management's sphere of action.

Plainly the individual consultant qualified to visit a plant, diagnose all its personnel and management problems, and then prescribe cures would be a managerial superman, nothing less. Yet an unfortunate impression did get about that the consultant's assignment would embrace just such a wide range of duties. In fairness to McNutt, however, it should be pointed out that he did *not* attribute to the individual consultant the miraculous powers of analysis which attention to all the factors of utilization might imply.

It is FACTORY'S wholly unofficial prediction that management will get *some* help from the consultant on *some* specific problems and some help from the Bureau (or *through* the Bureau) on nearly all problems.

There is every probability that the Bureau's most effective single service will consist of arranging for the loan of Mr. X, a crack personnel administrator in Plant A, long enough to set up a wartime personnel program in Plant B. There are many plants which never had adequate personnel programs in peacetime and many others whose personnel departments were swamped by the war. They are today ill equipped to meet the onrushing problems involved in analyzing future manpower requirements, determining available supply, and arranging for the orderly withdrawal and replacement of workers as military demands increase. They are in the market for all the help they can get.

Certainly there is little quarrel with the premise on which the Bureau is based. Manpower utilization is widely conceded to be far below the peacetime par in thousands of hastily expanded war industries. One outstanding management commentator, in fact, has asserted that there exists *within the present working force* an unutilized potential equal to 5 million productive workers. Obviously, then, anything this or any Bureau can do to improve utilization will be all to the good.

Incentive Plans

In important circles of the government outside WMC, serious discussion has lately been given to proposals for stimulating war production by wider use in industry of production bonuses or incentive plans.

At the time of this writing, no official announcement of plans has been made. But there have been a number of "leaks" and a great deal of consequent gossip. Charles E. Wilson, WPB Vice-Chairman, is reported to be keenly and personally interested in promoting the broader adoption of incentives for production.

The nature of the proposed incentive plans themselves has not been announced. It is believed that WPB may be moving toward proposal of some sort of plant-wide bonus, payable to all employees, on the basis of production performance in excess of schedules or of previous performance.

It is known that a subcommittee of the War Production Board's new Labor-Management Committee has studied certain incentive plans which WPB may recommend to industry. While some labor opposition might normally be anticipated, the Committee's indorsement would keep it at a minimum.

It is fairly safe to predict: (1) That nothing mandatory is contemplated; (2) that any single incentive system proposed would probably apply largely to a certain type of plant; (3) that the plan will not be attempted in plants for which an adequate and even flow of materials and manpower cannot be assured.

Developments

FOR THE SECOND TIME, the Administration's anti-inflation fight has thrust on the War Manpower Commission a huge new task that it is ill prepared to handle. First was the Byrnes 48-hour week order. WMC was not even notified of that one in advance. It had to frame suitable regulations after the announcement.

Warned this time, WMC was ready with a set of regulations when the President issued his "hold the line" order on wages.

On its face, WMC Chairman McNutt's implementing order of April 17 tells some 27 million workers, in farm, factory, railroad, or government service, to "stay put" in their jobs at current rates of pay.

Chief exception: Workers may transfer to essential activities from *any other form of activity* at higher rates of pay. But workers may not transfer from one essential activity to another, at higher rates of pay, except on issuance of "certificates of availability" either by employers or by WMC. Instructions on procedure may be obtained from WMC regional or area offices.

Chief guiding rule: Transfers genuinely in the interest of the war effort (i.e. those which upgrade employees to jobs requiring higher skill) will be okayed.

Note: Any employee is considered subject to the order "who, during the previous 30-day period, was engaged in an essential activity." This is meant to inflict a 30-day penalty of idleness on violators. In practice it may prove a loophole. Many prospective violators will be able to keep themselves occupied while waiting 30 days to qualify for much higher-paid jobs.

Sidelight: Workers may still transfer from one non-essential (non-deferable) activity to another at higher rates of pay, as they please. This leaves free a large group, those not

Regional Directors — War Manpower Commission

REGION I — Maine, New Hampshire, Vermont, Connecticut, Rhode Island, Massachusetts

Joseph A. Smith, 10 Post Office Square, Room 321, Boston (Lafayette 8600)

REGION II — New York

Mrs. Anna Rosenberg, 11 W. 42nd St., New York (Murray Hill 3-6805)

REGION III — Pennsylvania, Delaware, New Jersey

L. B. F. Raycroft, 1414 Widener Building, Philadelphia (Locust 3400)

REGION IV—Maryland, Virginia, West Virginia, Washington, D. C., North Carolina

Dillard Lasseter, Arlington Hotel Building, Room 405, 1025 Vermont Ave., N. W., Washington, D. C. (Executive 4660, Ext. 2015)

REGION V — Ohio, Kentucky, Michigan

Robert C. Goodwin, 650 Union Commerce Building, Euclid Ave. and E. Ninth St., Cleveland (Prospect 3100)

REGION VI — Indiana, Illinois, Wisconsin

William H. Spencer, 1200 Adams Franklin Building, 222 W. Adams St., Chicago (Andover 3600)

REGION VII — Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee

Bowman F. Ashe, Grand Theatre Building, 157 Peachtree St., N. E., Atlanta (Jackson 6500)

REGION VIII — Minnesota, Iowa, North Dakota, South Dakota, Nebraska

Frank M. Rarig, Jr., 500 Midland Bank Building, Minneapolis (Main 3244)

REGION IX — Missouri, Arkansas, Kansas, Oklahoma

Ed McDonald, 1600 Fidelity Building, 911 Walnut St., Kansas City, Mo.

REGION X — Texas, Louisiana, New Mexico

James H. Bond, New Mercantile National Bank Building, 6th Floor, P. O. Box 1530, Dallas (L. D. 745)

REGION XI — Montana, Wyoming, Idaho, Utah, Colorado

John R. McCusker, 221 Equitable Building, Denver (Gavor 3173)

REGION XII — California, Arizona, Oregon, Washington, Nevada

William K. Hopkins, 245 Furniture Mart Building, 1355 Market St., San Francisco (Klondike 2-2300)

subject to the "work or fight" order on non-deferables (i.e., men over 45 and women).

Important to employers is the revised list under 35 headings of essential activities and occupations also issued on April 17. Employees *not* on this list may be freely hired by employers *on* the list at any agreed rate of pay.

Enforcement of the April 17 order is an open question. Two principal limits on it are: (1) Extent of public willingness to comply voluntarily—which has been rendered doubtful by organized labor's announced opposition to the order; (2) effectiveness of employment stabilization agreements in 60-odd areas where these exist. (For description of one of the best ones see: "Louisville's Manpower Control" FACTORY, February, 1943.) WMC itself has no way of following up many of the millions included in the order. Selective Service, of course, keeps tabs on those of military age and can question their movements.

At Chairman McNutt's April 17 press conference, a reporter asked if the order wasn't "a National Service Act by decree." Actually it might better be called a limited attempt in that direction, a sort of reverse, negative, national service which is all that present law allows.

Undoubtedly "hold the line" had a pronounced, immediate psychological effect. Just as surely the April 17 order will tend to limit turnover. But the whole episode highlights a basic weakness of the war administration. Two separate agencies, War Labor Board and WMC, are given two apparently separate jobs, wage control and job control, which are really inseparable—and which neither agency can do well.

Selective Service

The first meeting of Selective Service State Directors since December, 1940, was held in Washington on April 7. Officials discounted its significance. But it had important aims. One big objective was to prepare Selective Service's network of local boards to take a unified stand on the "father" issue which will soon plague most of them.

Public pressure against induction of fathers while a single non-father remains (regardless of occupational status) will bear heavily on board members. Following the meeting, Selective Service postponed the evil day a bit by abolishing the 3-B classification (which combined dependency of every kind with occupational deferment). This threw all fathers into 3-A (deferment for dependency) and exposed those with more remote dependency claims to immediate reclassification in 1-A (available for immediate service) or deferment on occupational or physical grounds.

Worth watching is the prediction of Maj. Gen. Lewis B. Hershey that when fathers are called (beginning in July and August) they will be taken *by order number*. In other words a man 35 years old with four children has the same chance of being called at the same time as the man 25 with one child. Local boards will probably balk at this in practice. But employers should bear it in mind in analyzing the chances of draft-age employees.

Also worth watching is General Hershey's expressed hope that the 2-A and 2-B (occupational deferment) groups would be largely rebuilt of fathers. Obviously the "3-B" *principle* is far from dead, though the classification is. Boards will naturally tend to give greater weight to occupational deferment claims made on behalf of fathers. The obverse of this is equally significant: Employers will find it that much harder to keep non-fathers, no matter how essential.

Rise of Manning Tables

Apparently sensing the danger of heavy Selective Service withdrawals, management has shown greatly intensified interest in the Manning Table Plan (see "Manning Tables," FACTORY, November, 1942). After a rather slow start, this plan for systematic deferment of industrial key workers has gained widespread accept-

Manpower Breakdown

	December 31, 1942	December 31, 1943 (Est.)
Armed services	6,800,000	11,100,000
Unemployed	1,500,000	1,000,000
Agricultural	8,900,000	8,900,000
Manufacturing	15,700,000	18,600,000
Mining	900,000	1,000,000
Contract construction	1,700,000	1,000,000
Transportation utilities	3,500,000	3,700,000
Wholesale-retail	7,100,000	5,500,000
Finance, Service, Misc.	4,300,000	4,000,000
Government	5,800,000	5,800,000
Self-employed servants	4,000,000	5,000,000
Total labor force	60,200,000	65,600,000

This set of figures, introduced by Senator Green (D-R.I.) is the first to show manpower requirements of the manufacturing industries (war and civilian) rather than the more commonly used but vague figure for "war industries" which government sources have never clearly defined. Private statistical sources believe the above table gives one of the most accurate pictures yet published of the nation's climbing manpower requirements. The last two items leave room for some debate. Certain observers believe the government total will increase while the self-employed will decline. But the grand total, at all events, will not be greatly affected

ance. This is equally true, of course, of the Replacement Schedule, the simplified form (explained in FACTORY, January, 1943).

WMC officials have ordered a check-up, preliminary results of which indicate that well over a thousand manning tables covering at least a million employees are in force now. The number of approved applications is much larger, as is the number of replacement schedules. The latter is hard to estimate because many are not reported to Washington. Manning tables may be made mandatory if a national service act is adopted. At the start, many manning tables and replacement schedules were rejected due to tendency to over-estimate replacement training times. Currently the majority are being approved.

Rigid adherence to the original rule that only war industries and a few essential industries would be eligible to participate in the Manning Table Plan is indicated. The applications of employers having "borderline" claims are meeting with very little luck.

Management "Draft"

Overshadowed by other issues, the Austin-Wadsworth national service bill (see "Will We Get a Labor Draft?" FACTORY, April, 1943) has made little apparent progress in the last month. Hearings have continued before the Senate Military Affairs Committee. Most important new voice was that of Rear Admiral E. S. Land, chairman of the U. S. Maritime Commission, who testified in the bill's favor.

This bill, as FACTORY was the first to point out, definitely contemplates the conscription and mandatory allocation of managerial, engineering, and technical personnel as well as labor.

What may be a significant step in the direction of management conscription was quietly taken last month. To a selected group of specialists registered on the National Roster of Scientific and Specialized Personnel went a new questionnaire, returnable within 24 hours to Selective Service Headquarters. There were indications that an experiment was in progress to test the "work or fight" principle in shunting these specialists to jobs picked out by the Civil Service Commission.

Stabilization Agreements

The WMC-designated Group One labor shortage areas (in which no new war contracts are to be placed) has recently been revised, now includes 36 cities. The number of areas in which WMC labor stabilization agreements are operative, now about 60, will be increased as fast as WMC can find the necessary manpower. This is no joke. WMC's principal operating agency, USES, had a turnover of 100 percent last year.

Forecast

UNEMPLOYMENT HIT an "irreducible" 1,000,000 in March, while factory employment climbed to a new all-time peak of 16,000,000.

"We were slipping and now we are sliding into a real manpower crisis," was the way a WMC official put it.

Despite pronounced local variations, there is no shrugging off the over-all mathematics of 1943 manpower requirements. The total labor force, now at a record high above 60,000,000 (including the military) must be stretched to an estimated 65,500,000 by the end of this year. Those 5,000,000-odd must be drawn from among people who have never worked before. (This allows, incidentally, for a shrinkage of 1,500,000 in wholesale and retail trades, 700,000 in construction, and 300,000 in finance, service and miscellaneous trades.)

Meanwhile Selective Service will withdraw about 3,400,000 men from civilian life. The manufacturing industries will contribute a goodly share of these while facing, at the same time, the necessity of boosting their total employment to 18,600,000. It is still a safe rule of thumb that the average industrial employer will lose, in this year's draft, a number of men equal to all previous withdrawals.

A really startling figure (still kept secret) is the contemplated total number of those who will be deferred for occupational reasons other than agricultural. *It is very, very small.* As a matter of fact, it is probable that before the year is done, Selective Service will be dipping into the 8,000,000 men of military age who heretofore have been considered (for minor reasons) physically unfit for service.

The immediate factor which will bring the crisis to a head, however, will be the drive for 3,500,000 farm workers for temporary summer work.

In the face of these figures, no public or private agency has dared predict anything but a generally critical manpower shortage. Individual companies and communities may escape the worst of it. Some, in fact, will face surpluses of a temporary nature. Shutdowns will occur due to lack of materials and cancellation of contracts. Much rescheduling is inevitable. Design changes, based on performance in the field, will close whole plants.

But these things won't greatly affect *over-all* national totals. They can't. For 1943's war production schedule, don't forget, is 40 percent greater than 1942's.

Notes on Labor Reserves

Current publicity on women has distracted attention from two other important sources of labor supply. These are the 2,000,000 handicapped workers still available and the 700,000-odd registered aliens, only 8 percent of whom are Axis nationals. WMC has greatly relaxed hiring procedures in their favor. About 70 percent of these aliens are concentrated in seven states—New York, California, Michigan, Pennsylvania, Massachusetts, New Jersey, and Illinois.

The whole tendency of WMC policy for the future will be to *shrink* the list of essential activities and *increase* the non-deferables. The latter will gradually encroach on the still-unclassified middle area until finally there are only two brackets left, essential and non-essential. A new non-deferable list will be released in a few weeks. It will embrace most of the distributive services and may cut into some productive activities.

Reemployment Obligations

Employers are reminded of their obligation to reemploy servicemen under Section 8 of the Selective Service Act. Terms of this obligation are

DEFERMENT EMPHASIS ON OCCUPATION

"Whether a man of military age shall be exempt from service in the nation's armed forces depends more and more on the nature of his job and less and less on other factors, such as dependency and minor physical defects," said Maj. Gen. Lewis B. Hershey, Selective Service Director, in a recent forecast.

And on April 12 came a revision of draft classifications which brought the nation one step closer to the day when, as WMC Chairman Paul V. McNutt warned FACTORY readers (see "Manpower Outlook," January, 1943), "dependency alone is just about through as grounds for deferment."

Major feature of the new revision was the elimination of Class 3-B which had combined dependency with occupation as grounds for deferment. Here is the revised list:

In first meeting of Selective Service State Directors since December, 1940, Maj. Gen. Lewis Hershey got unified stand on the "father" issue

1-A—Available for military service.

1-A-0—Conscientious objector available for all kinds of noncombatant military service.

1-C—Member of land or naval forces of the United States.

2-A—Man necessary in his essential civilian activity.

2-B—Man necessary to the war production program.

2-C—Man deferred by reason of his agricultural occupation or endeavor.

3-A—Man with child or children deferred by reason of maintaining *bona fide* family relationship.

3-C—Man with dependents who is regularly engaged in agricultural occupation or endeavor.

3-D—Man deferred because induction would cause extreme hardship and privation to a wife, child, or parent with whom he maintains a *bona fide* family relationship.

4-A—Man 45 years old, or over, who is deferred by reason of age.

4-B—Official deferred by law.

4-C—Neutral aliens requesting relief from liability for training and service, and aliens not acceptable to the armed forces.

4-D—Minister of religion or divinity student.

4-F—Physically, mentally, or morally unfit.

4-H—Men 38 to 45 now deferred because their age group is not being accepted for military service. This group is being reclassified in case of eventual call.

The 3-D classification, providing for deferment because of "hardship" or privation, is new.

The 1,800,000 previous occupants of 3-B were thrown over into 3-A, whose 6,800,000 registrants were already being pared down to fathers of children born before September 15, 1942. In a short time 3-A will contain fathers only. This will make it ready for a second reclassification in which (technically, at least) the sole grounds for deferment will be those of occupation or physical fitness. Selective Service estimates that, by July or August, military necessity will dictate the classification of fathers in 1-A unless they can be deferred for occupational reasons.

being broadened, will unquestionably include commissioned officers, WAACS, WAVES, and every other branch whether inducted or enlisted. Obligation does not include persons hired to replace persons who have entered service. Persons so hired should be warned by employers that they are temporary employees without reemployment rights.

In war-built, single-purpose "war baby" plants, of course, the obligation to re-hire will disappear with the job itself. But war-expanded plants whose total employment decreases, say, to 50 percent of wartime personnel may find they will have to discharge permanent pre-war employees to make room for servicemen. It is a safe rule to assume that government will lean over backwards to give servicemen every break.

In a long war, reemployment obligation will become relatively academic. Few servicemen will wish to return to previous seniority, status, and pay. Many thousands of them will have acquired new skills.

Currently, Selective Service is handling reemployment of men discharged for disability or wounds in surprisingly large number.

Reemployment Division of Selective Service will set up a national network of community Reemployment Committees (comprising Chambers of Commerce, Rotary, American Legion, and similar civic groups) which will soon become operative.

"I Saw a Labor-Management Committee in Action"

STUART CHASE

Confirmation here of FACTORY's report (October, 1942) that labor-management committees are worth while. Although the author is not in industry, he has a background of long familiarity with industry problems, which qualifies him to write on this subject. An experienced reporter, he has been trained to set down only what he sees and hears

ALL OVER THE COUNTRY managers are sitting down with workers in an attempt to increase production and hasten victory. If the habits and procedures now being formed are driven in deeper as the war progresses, and if they stick after the war is over, an industrial peace is indeed in prospect. I am making no prophecies. I am just recording an exciting beginning.

Come along with me and watch one of these new Labor-Management Production Committees in action. The scene is the spacious board room of a large company in New Jersey. It has established collective-bargaining machinery with the CIO, and employs upwards of 6000 workers, twice as many as in 1940. On the walls are oil portraits—good ones—of officers of the company, past and present. The face of one of them you would all recognize. A great T-shaped table with a green baize cover stands under fluorescent lights in the middle of the room. There is a soft carpet on the floor, and a standing ash tray beside each chair.

Ten men are sitting around the table. I am introduced to each in turn, and as I shake hands I try to guess who is toiler and who is boss. Except in one case I cannot be sure. All wear business suits with collars and ties; all speak easily, with good diction. I suddenly realize how rapidly class lines are melting in America.

As I listen, I notice another striking similarity: Everybody is on the same side of the argument. And the argument is, how can we produce munitions more rapidly and save man-hours and material?

Actually there are four workers and four managers, making up the Central Production Committee of eight members. In addition there is the man who keeps the suggestion box records—a full-time job—and the head of the publicity department, who is working on posters for the Committee.

Everyone gives his opinion on each item of the agenda. Some talk eagerly, all with apparent frankness. There are no rows at all, and the differences of opinion seem to be *individual* differences, not labor versus management. Everybody is called by his first name.

The talk that goes on is a fair sample of what I heard at meetings in other companies, and presumably a fair sample of what live-wire committees are discussing the nation over.

The chairman reads a letter from an employee named Gene Winters. Gene has posted a sign on the windshield of his car: EN ROUTE TO THE XY COMPANY. Since he has used this sign, Gene says that he has picked up various workers who have missed their buses and so saved the assembly line quite a bit of time. He proposes that more stickers be printed and distributed to drivers. His idea is discussed and referred to the poster man. The latter promises action in 24 hours. "We work fast around here," says the chairman. "No red tape."

Next the Committee gets to work on a new system for suggestion boxes and awards. This is the heart of production drive committees everywhere. A report on the results of the present system is read by the man in charge. In six months, some 800 suggestions have been received, and 25 percent have been adopted. It looks like an excellent report to me, but the Committee is not satisfied.

"We can put firecrackers under a lot more of 'em," says the secretary. "Our suggestions come from men and women right on the job. They know with their own hands and eyes what needs improving. When they toss an idea in the box it comes out of their personal experience. We ought to get better than 25 percent."

Under the old system the reward for an adopted idea is a badge—a neat enameled pin to be worn on one's coat. The new system proposes War Bonds, up to $50, with a special $100 bond for the best suggestion each month, and another for the employee putting in the largest number of adopted ideas.

Plenty of Talk

Discussion is lively. "If a small War Bond is given, and the idea saves the company thousands of dollars—like that power press one we issued an award for the other day—won't the worker feel that he is left out in the cold?"

"It isn't between him and the company. It's both of them helping to win the war."

"Right. These suggestions are not for the individual, or the company, or the industry, but for the United States. That's what we've got to get over to everyone in this plant."

The chairman speaks up: "This company isn't going to add to its net profits whatever the savings these ideas make. They will be taxed away, or contracts will be re-negotiated. We

(*Continued on page 189*)

Using Both Ram and Fork With One Lift Truck

H. C. RAMSEY, General Foreman, Wire and Cable Division, General Electric Company

IMPROVED HANDLING METHODS are saving 600 man-hours and 300-truck hours a year in General Electric's wire department at Schenectady.

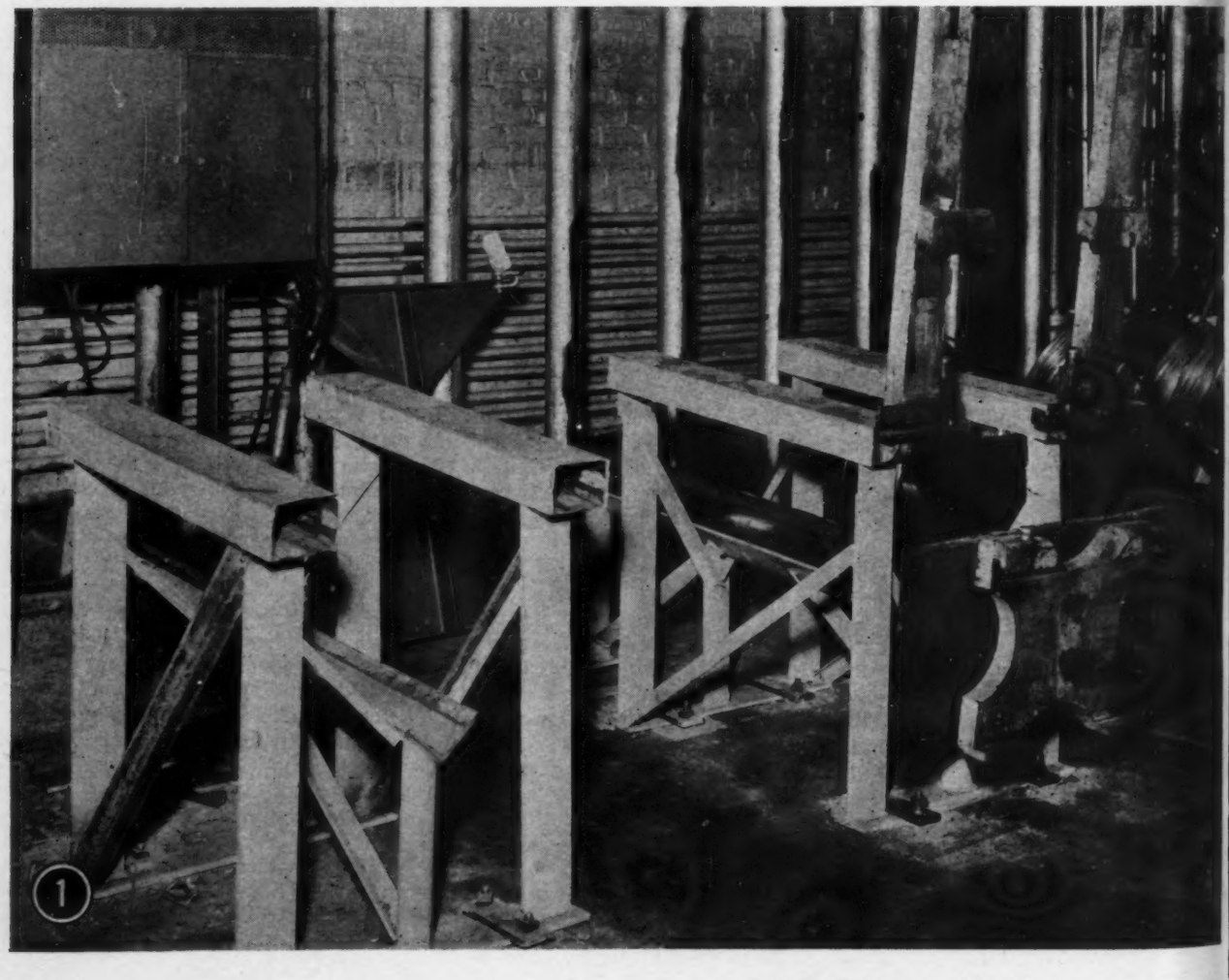
Rod and wire products, handled by lift trucks, required frequent changing of the lifting device from ram to forks and back again. The work did not divide up so that one truck could be assigned to ram lifting and another to fork lifting. Making the change of lifting device by hand took two men about 10 minutes—and the idle device was usually left on the floor, creating a hazard.

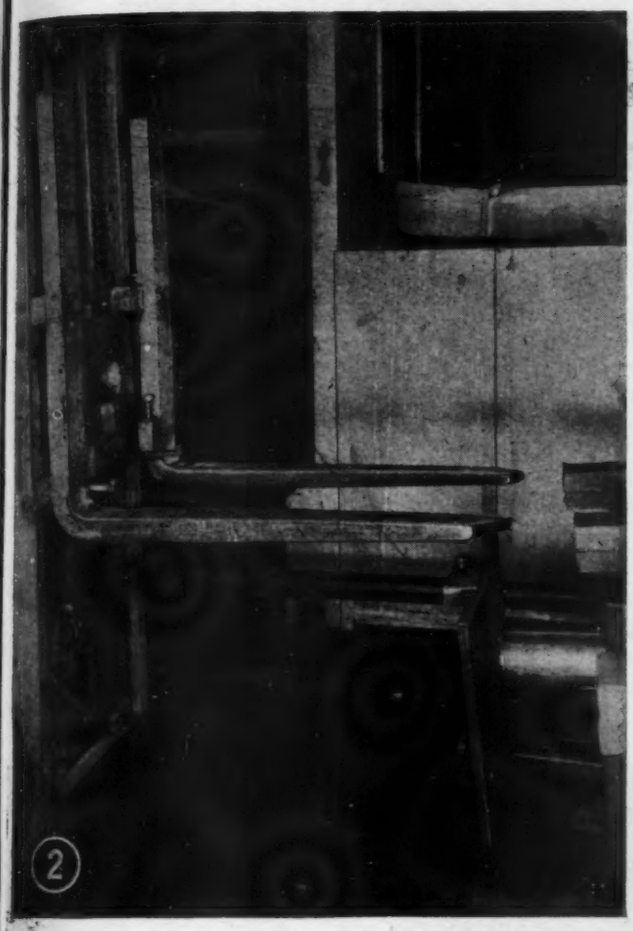
We therefore built a stand which holds the devices in position for changing. Now one man can switch them in about 30 seconds. The stand accommodates both the ram and the fork. To change from one to the other, all the operator has to do is run the one on his truck into its proper position in the rack, unlock the safety holding catch, and lower the lifting carriage so that it disengages the tie bar. He then brings the carriage up under the tie bar on the other device so it is hooked properly, backs the truck away until the device is free from the rack, and locks the safety holding catch.

Further savings in handling time were made by improving the method of storing coils of wire. Formerly the coils were loaded on skids which were handled by lift truck. The skids, with their legs, braces, and back made of steel, were cumbersome and took up considerable space. Hardwood boards were used to separate the coils from one another to prevent damage in handling.

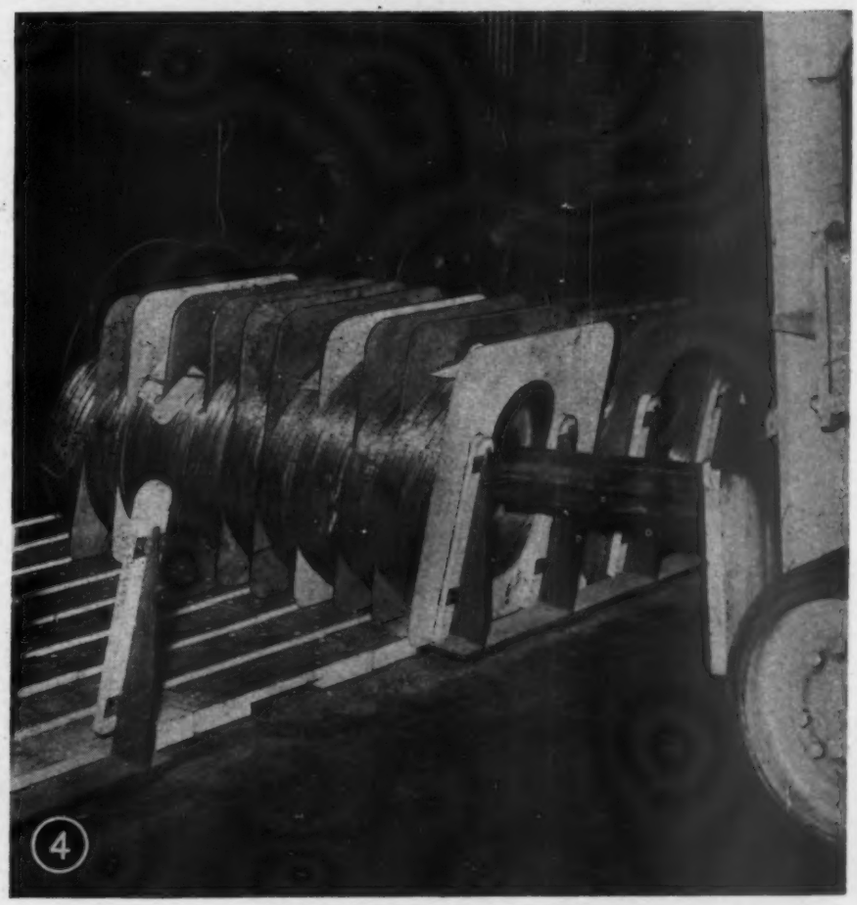
Now coils are stacked on the floor on sectionalized wooden platforms, and are inclined slightly forward against a U-shaped stand. Horse collars to separate the coils are made of ⅛-in. fiberboard, which is cheaper than board and can be more easily stored when not in use.

This arrangement permits easy and quick handling of the coils on the ram of the truck. A portable stand is





used when it is necessary to get only one coil from a stacked row. The stand, which inclines backward, is placed at the back of the row, the coils up to the desired one are tipped against it. The coil wanted is then rolled out from the row, and picked up by the ram.



1 Quick-change station for lift trucks. Stand holds ram or forks, or both. In the foreground is an empty stand; at the rear, one with both ram and forks in place

2 Here comes a truck all ready to change its forks for a ram —a job that used to take two men 10 minutes every time

3 Truck has put away the forks, picked up the ram, and is all set to go again. Total elapsed time—30 seconds

4 Coils of wire are stacked on wooden platforms, inclined slightly forward against a U-shaped stand. Horse collars of ⅛-in. fiberboard separate coils

Good Food—and No Time Lost

Nutritious food is a war-plant "must." Problem is to serve it without making men walk a mile and wait in line. Here's the Brooklyn Navy Yard's solution

AN ARMY TRAVELS on its stomach. So do welders and machinists, in the opinion of Rear Admiral E. J. Marquart, Commandant of the Brooklyn Navy Yard, who has set in motion a program that is changing the habits of riveters, welders, and machinists, and inducing them to eat a balanced meal instead of just a hot dog or cold sandwich and a hasty cup of coffee.

At the same time the program, through the speediest possible service, cuts waiting in line for meals to a couple of minutes, thus minimizing idle time of the big lathes, borers, and other machine tools.

Under the new system, workers are served a balanced, nutritious meal in paper cups and containers of different sizes and shapes, which are quickly fitted into apertures in a paper tray. The method is similar to that of some airlines. No time, space, or labor is wasted in dish washing.

Unique in many respects for war plants, the system was worked out in cooperation with the canteen company handling the industrial feeding operation at the Yard.

The system solves the complicated mealtime problem caused by the rapid increase in workers at the Navy Yard. Their number now compares with the population of a medium-sized city. Lack of floor space prevented feeding them by expanding or increasing the number of cafeterias already in existence. The lunch counters in the shops and the hot-dog stands beside the big shipways proved entirely inadequate. Long lines of men piled up at these facilities at mealtime. After they finally got their food, they did not have much time to eat it. And often it did not provide them the nourishment they needed. The schedule of workers building and repairing warships on the waterfront calls for a 45-min. lunch period. But in the shops where lathes, planers, shapers, and boring mills fashion the parts

Good food, either hot or cold, packaged all ready to be picked up and placed in specially designed trays, makes quick-lunching really quick, provides a nutritious meal for hard-working shipbuilders

of warships, only 15 minutes are available for lunch for each 8-hour shift. This is to cut idle time of these machines to three-quarters of an hour a day.

A study of the situation resulted in a three-point program:

1. Centralization of cooking for the entire yard in four kitchens.

2. Expansion of facilities for keeping and serving a variety of nourishing hot foods from the outdoor booths and lunch counters, which serve 85 percent of the civilian workers.

3. Use of a special carton-type paper tray with covered paper cups and containers, to double speed of service and cut down waiting in line to two or three minutes.

This is the way the system works. At 11:30 a.m., the lunch siren. Military music or swing, played by the Navy Yard band, bursts forth from a loudspeaker. Shipfitters, electricians,

(*Continued on page 200*)

Cleanliness is added to speed in this method of serving food

Almost any place in the Yard provides a spot for the men to perch and eat their lunches

Peoria Plans for Post-War

L. K. URQUHART, Managing Editor, *Factory*

PEORIA INDUSTRIALISTS are already looking forward to winning the peace. They believe if we wait to start winning the peace until after the war is won, we shall stand an excellent chance of losing it. And they don't want to go through that one all over again.

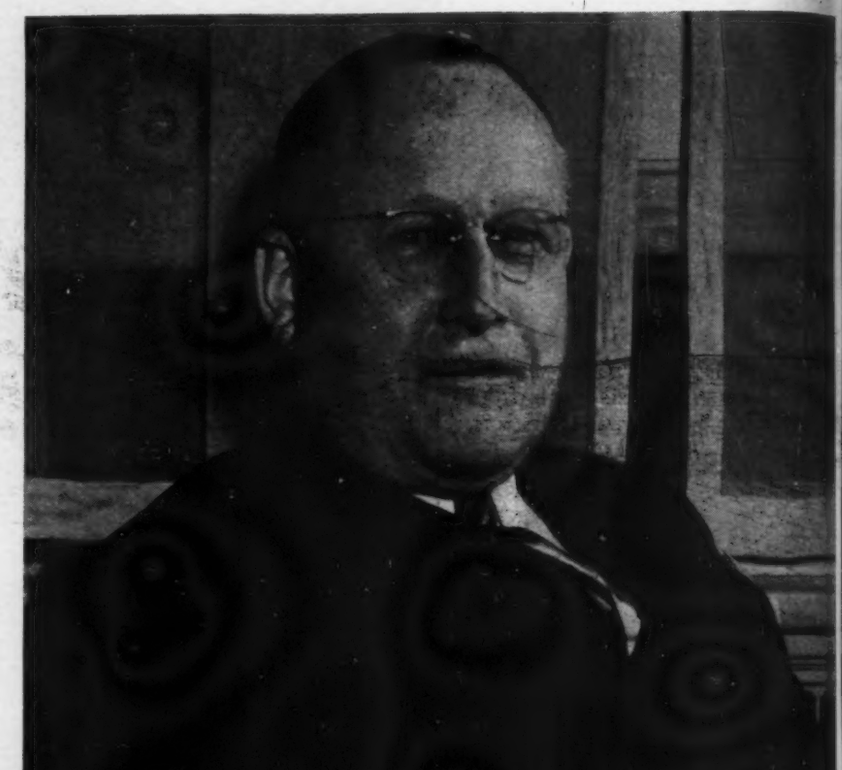
To them, therefore, the dangers and hazards of the post-war era have already become its opportunities. They have taken, as a group, the first long look into the post-war crystal ball and come up with a prediction that should bring encouragement to every other industrial community in the country. In short, these Peoria peerers into the future estimate that their employment after the shooting is over can be and will be substantially what it is today.

Estimate of Employment

No starry-eyed post-war planners they. Allusion to crystal gazing notwithstanding, this is not plain unadulterated thinking of the sort customarily fathered by the wish. It is instead a cautious look-see at after-the-war possibilities for Peoria, and a canny estimate of what these same possibilities may offer in the way of factory employment. To Peoria post-war planners, then, the picture looks like this: 22,000 employed in Peoria plants in 1940; 30,000 today; 29,000 after the war. The other thousand will be youngsters who ought to go back to school, oldsters who ought to quit, anyway, and women who ought to be back in their homes.

In making this prediction, these men of Peoria stress the point—and we stress it here again—that all the foregoing is not a promise. It is only a guess. We can safely add, however, that it is an *intelligent* guess of the identical sort that successful companies make every year of their corporate lives. It is based on certain assumptions, of which the chief one is that the "climate" in the post-war period will be favorable for business expansion.

That the climate must be right, is one of the conclusions of the organization that urged Peoria industry to make the study which resulted in the foregoing prediction. The other conclusion of that organization is that the goal of a high level of employment can never be reached unless individual business enterprises throughout America start planning their individual programs of post-war planning and merchandising now.



"I'm a guinea pig from Peoria," says Walter Gardner, general sales manager of Keystone Steel & Wire. He heads the Peoria committee

"We have got to have the climate ripe for roaring, hell-raising, risk-taking economy after the war ends, if we are going to have the kind of expansion that will alone provide the necessary number of jobs in private employment . . . If the myriad enterprises of America start their planning now, boldly and intelligently, the 130 million Americans may have the chance to plan their own lives after this war. We are really hoping and striving for the right to plan our own lives. That right is going to rest in no small way on how intelligently American enterprises plan for a bold expansion in the post-war period."

The quotation is from a talk by Paul G. Hoffman, president of the Studebaker Corporation and chairman of the Committee for Economic Development, which for some months has been devoting its energies and talents to post-war planning, and which FACTORY readers will be hearing more and more about as the months roll by and V-day approaches. It is one of several organizations* that are urging business and industry to begin planning now to convert to peacetime opera-

* Other private organizations engaged in post-war planning activities include National Association of Manufacturers, U. S. Chamber of Commerce, and the National Planning Association.—Ed.

Caterpillar's post-war planning job has been handed to D. A. Robison; program is under way

Frank Ross's action committee got action. His own company is already planning its post-war program

tion and to maintain a satisfactory level of employment during the conversion period—and from then on.

Lest some reader jump to the conclusion that CED is another of "those alphabetic agencies," this is the time and place to state that it can be called alphabetic solely for the reason that it is manifestly inconvenient for people to go around murmuring "Committee for Economic Development." Fact is, CED has no *official* status unless someone insists that a Washington office lent to it by the Department of Commerce compels such status. It actually has nothing more than governmental blessing. It was organized by men in industry who believe there is a job to be done and feel it would be wiser for industrialists to try to do that job than to let things go by default and then wake up some morning to find the job being done for them.

"The CED," to quote Paul Hoffman again, "has been organized to assist commerce and industry in preparing to make its full contribution to stability and prosperity through high levels of employment and productivity when peace comes.

"The members of the committee believe that the successful prosecution of the war is the first concern and paramount obligation of commerce and industry. They are convinced none the less that the *most* commerce and industry can do now to assure returning soldiers and workers presently engaged in war industries that peacetime jobs will be available, is the *least* which must be done if enterprise and labor are to enjoy a free society."

Problem Boiled Down

This is obviously a tough assignment. Our gross output for 1943 will run around 160 billion dollars, of which 85 billions will go into war goods. When the shooting stops, the government will no longer be in the market for anything like 85-billion dollars' worth of war goods. Some 7,000,000 men in the armed services, plus 20,000,000 people in war industries, will be returning to peacetime pursuits. So the problem boils down neatly into the need for providing 85 billions in peacetime goods and services to offset current production of war material. Making allowances for the high cost of war goods, we are therefore faced as a nation with the necessity for achieving a national output of 135 billions, 35 percent more than the all-time peacetime high attained in 1940. Furthermore—and CED emphasizes this—we must reach that new high level quickly, not later than two years after the peace, unless we are to have millions of people walking the streets of our cities looking for jobs.

So much for the background against which the Peoria plan must be projected. It all came about very simply. CED has a field development division which operates through twelve regional chairmen—one from each of the Federal Reserve Districts. It is the function of this division to collect, integrate, and disseminate: (1) Significant statistical data; (2) case histories of business planning already in operation; (3) other material to aid management in preparing for post-war progress.

In order to carry out this program, the regional chairmen have appointed, or will appoint, somewhere between 135 and 150 district chairmen, each charged with the responsibility of organizing committees within their respective towns.

Through this organization CED's field development division will:

1. Encourage maximum planning by individual companies.

2. Assist trade associations to organize for post-war planning within their own industries.

3. Assist communities to organize for such planning.

4. Form a liaison for exchange of information among individual com-

To FRANK ROSS, Chairman,
Action Committee,
1800 N. Adams Street,
Peoria, Ill.

Name of Business_____

Address_____ Street, Peoria, Ill.

Peacetime Products Manufactured_____

	1940	1942 (Include munitions and war products along with peacetime products.)	POST-WAR (If these figures are not calculated as of 60 days after peace declaration, please explain.)
Total Gross Sales in Dollars			
TOTAL AVERAGE FULL-TIME EMPLOYEES . .			
How Many Women Included in Above Figures . .			
How Many Employees in Each Shift —			
Day Shift . . .			
Second			
Third			

Remarks: Please add comments and explanations — i.e., if these figures cover more than one plant in Peoria or elsewhere, subsidiaries, etc.

Note: These figures are to be held confidential and will be reported to the public only as *Peoria totals.*

Signed_____

Title_____

_____ 194____

Check sheet was returned by 45 of the 49 Peoria companies surveyed

panies, trade associations, and local communities.

Which brings us around to Peoria. The regional chairman in Chicago for CED's field development committee is Ralph Budd, president of the Burlington Railroad—and it was he and C. Scott Fletcher, director of field development at CED headquarters in Washington, who went to Peoria to address a picked group of 20 business and industrial executives. Those present at that meeting heard CED's story and agreed that Peoria should be a test city. Walter Gardner, general sales manager of Keystone Steel & Wire Company, was named chairman.

Peoria was chosen for the test because it was probably the closest thing in Budd's district to a "typical" American manufacturing town. It is big, but not too big—122,000 people, with about 6000 in the armed services. Its adjustment to war production was fairly simple. Most of its plants went on making the same products for war uses that they had been making in peacetime. A few plants—like Altorfer Brothers Company, which made washing machines before the war—had fairly serious jobs of conversion to do, and will have similarly serious jobs on their hands when the war is over. For most of Peoria's plants, however, the job of conversion and reconversion has been and will be easy sailing. Above all, Peoria has no war babies to worry about, no huge new plants built strictly for war purposes. In this respect perhaps it is not typical, because most cities have such plants. It may fairly be said, however, that Peoria's problem is the same problem in miniature that the country as a whole is going to have to face.

"I am a guinea pig from Peoria," said Gardner later at a symposium where the Peoria plan was presented to another group. "We knew that sooner or later this job had to be done. We thought it would be fun to be among the first cities to do it . . . We liked the way it was presented to us as individual industries. There was no formula to stick down our throats; nobody told us they had a recipe for regimenting our life from the womb to the tomb."

How the Job Was Done

Gardner moved fast. Within four days he had planned a presentation piece to be given to executives of Peoria industrial concerns. And within two weeks he was ready to name his executive committee of six members, with himself as chairman; an action division of four headed by Frank L. Ross, manager of the Eastern Division, Willamette Hyster Company; a research division under the leadership of G. R. Roelfs, sales coordinator, Central Illinois Light Company; and a public relations division.

The research division then made a study of Peoria industries, found there were 49 manufacturing concerns employing 50 or more people. Of them, only four employ more than 1000 workers. They are Caterpillar Tractor Company, Keystone Steel & Wire Company, R. G. LeTourneau, Inc., and Hiram Walker & Sons, Inc. Representatives of these 49 companies were then invited to a dinner meeting at which Messrs. Budd and Fletcher again told their story and local men reported. Each man present was given a copy of CED's "Handbook for Employers" and a check sheet which they were asked to fill out by a certain date.

The check sheet was page 4 of a 4-page presentation containing the following appeal:

"This is an appeal to managements who believe in the vitality of private industry. The last gun of the war will be the starting gun for peace. Then will come the sudden shock of

(*Continued on page 204*)

New Procedures in CMP

This article was prepared especially for *Factory* by the Controlled Materials Division of the War Production Board. It supplements *Factory's* earlier treatment of the topic (See "The Controlled Materials Plan" by Donald M. Nelson, with supplementary chart, December, 1942, and "What's New About the Controlled Materials Plan," February, 1943)

MANUFACTURERS operating under the Controlled Materials Plan have been warned by the War Production Board that they must (1) make allotments, and (2) authorize production schedules for their Class A product suppliers in conformity with requirements of CMP Regulations. Otherwise, they will fail to secure their necessary production materials.

A prime consumer must do the following to meet these requirements:

1. Authorize a production schedule on forms prescribed by the War Production Board or as provided in paragraph (n) (2) of CMP Regulation No. 1, under which the delivery date specified on an order constitutes an authorization of such minimum production schedule as may be desired to make delivery on the date specified.

2. Allot controlled materials by (a) specifying on the purchase order for the Class A product involved, the amount of controlled materials alotted; (b) indorsing the order with the appropriate abbreviated allotment number; and (c) the certification prescribed in CMP Form No. 5 or the optional form in Regulation No. 7.

The abbreviated allotment number consists of a Claimant Agency symbol, the first digit of the Major Program Number, and the two digits indicating the quarter for which the allotment is valid. In the case of an allotment number W-1234-567-16, the abbreviated allotment number would be W-1-16. The numeral "16" in the example given indicates that the allotment is valid during the second quarter of 1943. However, a person receiving such an allotment must indicate on his order for controlled materials the month in which delivery is required, that is, either 16, 17, or 18, which represent April, May, and June of 1943, respectively.

At the time of making allotment, the preference rating assigned to the authorized production schedule must be passed on to the manufacturer in order that he may be in position to obtain non-controlled materials.

New Symbols Used

In any case where Class A product orders already placed have not been validated, such orders must be treated as follows, to assure delivery of materials: (1) The necessary allotments may be made by sending duplicate copies of the purchase orders, following the procedure outlined above, or (2) the purchaser may furnish the supplier with a list of orders for which he is making allotments, so long as each allotment is identified with the order for which it is made. As a matter of convenience, the order identification may be included in a separate column on Form CMP-5.

The delivery dates specified on orders already placed constitute authorization of a production schedule.

An entirely new set-up, Class B product symbols, has been assigned to items falling within the jurisdiction of the various Industry Divisions of the War Production Board. These new symbols replace the former S-3 designation which was used for B products during the second quarter, and they will not be applicable until the third and subsequent quarters.

The new symbols are applied to provide the War Production Board with a means of determining at mill levels the uses to which controlled materials will be put.

The symbol indicates the Industry Division and the B product program under which the product falls. For example, storage batteries, air and hydraulic motor brakes, automotive wheel assemblies, carburetors, except those for aircraft, automotive repair shop special machinery and equipment, and spark plugs except for aircraft, are designated B-4. These items are under the jurisdiction of the Automotive Division. A special program designated S-4 has been established to cover a miscellaneous group of B products including such items as chemical producing machinery for plastic molding machinery, asbestos textiles, jewel bearings, and numerous others.

CMP is virtually in full operation at the present time with respect to producers of controlled material. Special Directives have been issued with respect to steel, copper wire mills, brass mills, and aluminum rod and bar producers. The steel Directives prohibited displacement of any rated order in a mill production schedule prior to April 15, if it had been scheduled for delivery during the second quarter as of March 22, 1943, merely because of the fact that it had not been assigned an allotment number; however, after April 15 it became possible to displace such orders which had not been assigned allotment numbers in mill production schedules. Therefore, the Plan is virtually in complete operation with respect to steel mills at the present time.

In the case of copper wire mills,

brass mills, and aluminum bar and rod producers, similar protection was granted to orders which had been scheduled for delivery during April. However, in all three instances, it was required that orders placed for delivery during May and June be accepted, thus, as of May 1, CMP is, practically speaking, in full operation with respect to these producers.

Consumers of controlled materials are cautioned that their orders for such items must be placed in accordance with the time schedules specified in Schedule III of CMP Regulation No. 1. Copper wire mills and brass mills have been granted permission to refuse orders which are not placed sufficiently far in advance to comply with the time limits established in the Schedule. It is likely that similar permission will be granted with respect to other controlled materials.

Controlled Materials Plan Division officials are working to install the system of making advance allotments as soon as possible. The feeling is that until advance allotments are being made, CMP will not assume full stature as a long-range scheduling plan.

Operators of mills and factories must be able to anticipate material supplies for longer than three months in advance in order that their own efficiently functioning production schedules may be established. At the present time, it is anticipated that advance allotments will be made by granting a percentage of amounts of materials granted in a base period. In the future, it may become necessary to adopt some alternative means of making advance allotments, but this cannot be done at the present time.

Producers handling orders placed prior to April 7 by dealers, distributors, and jobbers who are permitted to extend priorities ratings under the terms of CMP Regulation No. 3 as amended, must guard against displacing any such orders, calling for delivery during the second quarter of 1943, in their production schedules, inasmuch as such orders have been granted the same grade of rating as orders placed by others which are accompanied by allotment numbers. This means that orders placed by dealers, distributors, and jobbers must be deemed of equal rating to other orders bearing the same rating and allotment numbers, and this fact must be taken into account by producers in adjusting their production schedules.

Preference ratings assigned by CMP Regulation No. 5 may be used to secure repair parts for office machinery and equipment, WPB officials have indicated. This Regulation specifically prohibits the use of MRO ratings to secure machinery and equipment, but repair parts are not included within the definition of these items.

Resellers of controlled materials who ship them to foreign countries (other than Canada) are permitted to accept allotments from their foreign customers and pass them along to producers of steel, copper, and aluminum in this country in placing orders for these items, the War Production Board has directed. Foreign customers would receive these allotments from the Board of Economic Warfare or the Lend-Lease Administration. In selling steel, for example, the foreign countries' mills customarily either operate through an agent or sell to a reseller with a discount allowance for the resale margin. Under the terms of CMP Regulations as originally drafted, it was impossible for such resellers who ship to foreign countries to extend allotments to mills and consequently they have been unable to operate. General Direction No. 1 under CMP Regulation No. 4 permits such resellers to pass on allotments which they receive to producers, thus permitting controlled materials suppliers to establish authorized production schedules for the items.

"Concentration" in Britain

JOHN WELCH, Editor, *Mill Supplies*

"CONCENTRATION" sounds like a bugaboo to most American industrialists, who picture it as an indiscriminate slaughter of innocent small businesses not directly involved in the war effort. But this is not how concentration has worked out for the industries of Britain, as I discovered on a recent visit to England.

Concentration of production aims at four objectives: (1) Getting space and labor for munitions production; (2) avoiding the uneconomical use of labor; (3) avoiding the complete extinction of smaller firms and industries which will be important to England in the post-war economic struggle; (4) keeping alive Britain's export traffic.

The program's first step came in 1940, shortly after Dunkerque, with a "limitation of supplies" order which specified how much certain industries might *sell* in proportion to their sales during a base period of one year beginning with June 1, 1939. Note that at first the attention was to the manufacturer's *sales* of his output, not to his production.

In time, the effect of this order was to leave a number of plants operating on a considerably reduced scale. From the standpoint of a war economy, this was grossly inefficient. It tied up machines, floor space, and workers uneconomically. It was then that concentration of production was sought, in order to have a reduced number of factories carry the whole load by working full time. The idea of having "nucleus" plants to do this was worked out between associations and the Board of Trade.

Nucleus firms and all those participating are eligible for inclusion on a list of "protected" firms. Firms on that list have a lower age of reservation for their workers in the draft. The fact that a firm is classed as "protected" is taken into consideration in dealing with appeals for deferments. As far as possible, government orders are given to such firms, and, as far as possible, the Board of Trade will prevent such factories from being requisitioned once they have been set out as nucleus plants. Above all, it was officially declared at the outset that "help will be given these firms to safeguard, as far as possible, their supplies of raw materials."

In August, 1942, the concentration program was advanced in many industries to a stage called the "direction of production." It was found necessary to take a hand in scheduling a manufacturer's product in order to provide for the actual needs of the people. A producer who found it more profitable to make women's clothing than to make clothing for children was prevented from going to extremes that might endanger the supply of the latter. Simplifications were directed in order to make production efficient in labor, machines, and power.

First of six informal sessions begins with the instructor's writing his name on the board

Orienting the New Worker

JOHN H. FRY, **Director of Education, North American Aviation, Inc., Inglewood, Calif.**

A WAR JOB to be done, thousands of new employees to be absorbed, and no time to spare from production for lengthy training. This is the problem that confronts all war industries today. We are solving it at North American through a program of employee induction and orientation.

Since early December, 1941, all production employees at NAA have received six one-hour lectures designed to familiarize them with company regulations and procedures, to put them at ease on the job, and to develop the best possible employees in a minimum time. And since June, 1942, the same program in streamlined form has been given to all new office workers as well.

A composite picture of the new employee who has completed the induction program, as reported in a series of personal interviews with foremen and general foremen, indicates that he:

1. Absorbs job information quickly and adjusts to routine rapidly.

2. Appears well disciplined, and has knowledge of and abides by shop rules and regulations.

3. Is able to work under pressure and take orders in good spirit.

4. Appears at ease, has confidence, and displays no fear of supervision or of the job.

5. Has helped to improve shop morale and reports to proper authority for information and assistance.

6. Displays considerable initiative and frequently requests additional work at the completion of a specific job assignment.

7. Appears very much interested in his work and spends a maximum amount of time on the job.

8. Makes use of good shop housekeeping methods, and is conscious of and interested in safety.

9. Is aware of the importance of establishing good work habits; evidences interest in the possibilities of job simplification.

10. Is distinctly superior, on the whole, to employees who did not receive the same training.

With this picture of the result in

mind, it is worth while to note the methods used. What has been done here at North American can be done in any rapidly expanding industry. Our program is purposely so flexible that it can be changed to fit any set of circumstances, or to encompass any special problem. For example, in making a survey of employees we learned that the majority of new people have a vast curiosity about the products manufactured, and seize every opportunity to get a "look see" at the finished airplanes. It is only natural to take a greater interest in a job when you know its relation to the completed product. Thus it was arranged that all employees being escorted to the educational section for the first of the induction series (which is attended the day they report for work, before they are taken to the department to which they are assigned) are taken through the plant by a route which passes final assembly floors and a number of subassembly departments.

This is in no sense a "factory tour." The employees do not stop, nor do they interfere with production. They do, however, have an opportunity to see the ships being completed on the huge assembly lines, and they can better visualize how the thousands of small parts grow into the bomber that roars over Berlin.

Without any inconvenience, trouble, or extra cost, curiosity is dispelled, and interest in the new job is awakened. Concentration on the lecture content is better because the intense desire to "get out to see the airplanes" has been satisfied.

Six Sessions

In setting up the program as a whole, the objectives to be attained were considered from two standpoints:

1. How soon would the employee require specific information?

2. Of those problems to be faced by the employee at a future date, which were the most important.

In order to give the employee time to assimilate the knowledge gained in each session and apply it on his job, the plan has been to give one lecture a week for the first six weeks of employment. It is obvious that only a certain amount of information can be conveyed and absorbed at one time; thus the first session was designed to answer the immediate questions of the new worker and to give him the information that would make his first hours and days more efficient.

In the case of women, it is also necessary to orient them to this new and different factory life, and to overcome a sense of strangeness due to the size of the factory, the thousands of unfamiliar faces, and the noise.

Mr. Smith arranges to get a ride

"MR SMITH CO TO NAA"
is the title of a s film shown at first session of induction progr It depicts an ployee in typ situations. Som slides are illustr

At the time he is hired, each employee is given a book of company rules and regulations, and is told to read it thoroughly before reporting for work. The book includes a short history of the company and information about employee facilities. It is around this material that the first induction session has been developed.

1. Mr. Smith at NAA

When they arrive at the lecture room after coming through the factory, the employees are greeted by a trained member of the educational staff, whose first aim is to put them at ease and officially welcome them as new personnel. They are invited to smoke if they wish, and are otherwise encouraged to make themselves completely comfortable.

To assist in determining which information should be re-emphasized in the ensuing discussion, the lecturer passes out a "quiz" sheet containing 34 simple "true and false" statements pertaining to the rules in the handbook. The objective of this first quiz is primarily to put the information across as "information" rather than to conduct a formal examination. As an example of the type of material included in the quiz, there are both true and false statements pertaining to badge displays, proper identification, procedure on reporting absences, and pay-day routine.

After the quiz, the papers are exchanged and corrected, and employees are encouraged to ask questions about any point that is not entirely clear.

This is followed by "Mr. Smith Comes to NAA," a slide film depicting an employee in typical situations at the plant. Topics include how to use time clocks; location of payroll, first aid, welfare, the tool store, and other departments in which the employee is vitally interested; a discussion of basic safety rules, restricted areas, the importance of good work habits, and facts that provide an over-all picture of North American.

For instance, one slide shows "Mr. Smith" eating his lunch near his workplace; here the instructor adds a few comments on the necessity for proper disposal of waste, and the danger of spoiling an entire container of scrap metal by contaminating it with foreign substances. In like manner, the scenes showing Mr. Smith patronizing the candy and beverage machines lend themselves to a discussion on loitering, delaying production, and so on. The instructor encourages questions or comments from the group members, the aim being to make certain each point is thoroughly understood by all.

2. Accident Prevention

Since accident prevention is of major importance, both to the individual emplovee and to the company, and is a problem that has not previously confronted most women, this subject is discussed at the second ses-

. . . punches the clock on his way in

. . . purchases some tools at the store

. . . registers for a training course

. . . buys himself a nickel candy bar

sion. The instructors have secured some exceedingly graphic examples of the manner in which correct safety practices have saved employees the sight of an eye or prevented serious injury. All represent actual occurrences at North American. Since eye injuries are the ones most apt to occur, the greatest emphasis is placed here, and the exhibits include an eyeshield badly spattered with molten metal, shattered safety goggles, shattered safety spectacles, and a torn face shield.

Emphasis is placed on the "feminine angle" by explaining what can happen if the hair is not completely covered, if loose pockets are worn, and if "dangling" jewelry is not covered while at work. The details of each of the illustrated "prevented accidents" are given, and the instructor takes full advantage of the dramatic possibilities to emphasize the importance of using safety devices; he usually fits the spattered eyeshield over his own face to illustrate where the molten metal would have struck had the shield not been used, places the glasses on his eyes, and shows the broken circular saw that flew into the face shield.

In almost every class one or two people will volunteer accident experiences of their own, providing the "personal touch" and bringing home the need for safety.

The slide film shown at this session is "Unintentional Sabotage," which illustrates the losses to the war effort through accidents to men and machines. The underlying moral is that a saboteur would consider he had done a good day's work if he were able to accomplish the same results that are accomplished daily through accidents, and that actually the careless employee is an instrument for "unintentional sabotage."

3. Personal Safety

In logical sequence the third session is devoted to personal safety, which covers primarily material pertinent to

keeping well and avoiding infection. Here, again, the employees are encouraged to volunteer personal experiences, and almost without exception several good examples are secured. Sensible rules for personal health are given, and some time is devoted to discussion of proper diet. A chart has been prepared showing the vital foods that must be included in the balanced diet, and listing energy foods. These charts are offered to the employees if they wish them. The chart also lists some basic rules for the proper cooking of simple daily foods.

The instructor talks about personal hygiene, and, since absenteeism among women has been found to be higher than among men, he ties all discussion in with the patriotic necessity for being "on the job" every day. Comparative figures are given, showing how many planes could be built if it were possible to utilize the man-hours lost in one week through absences for one reason or another. An appeal is made to the employees to do everything possible to keep themselves on the job every day, in order that the production line may properly back up the fighting line. The film shown at this session is "Open for Infection," a vivid portrayal of what can and does happen if small cuts and wounds are neglected, thus bringing back to mind the selfish interest of the employee in having these things not happen to him.

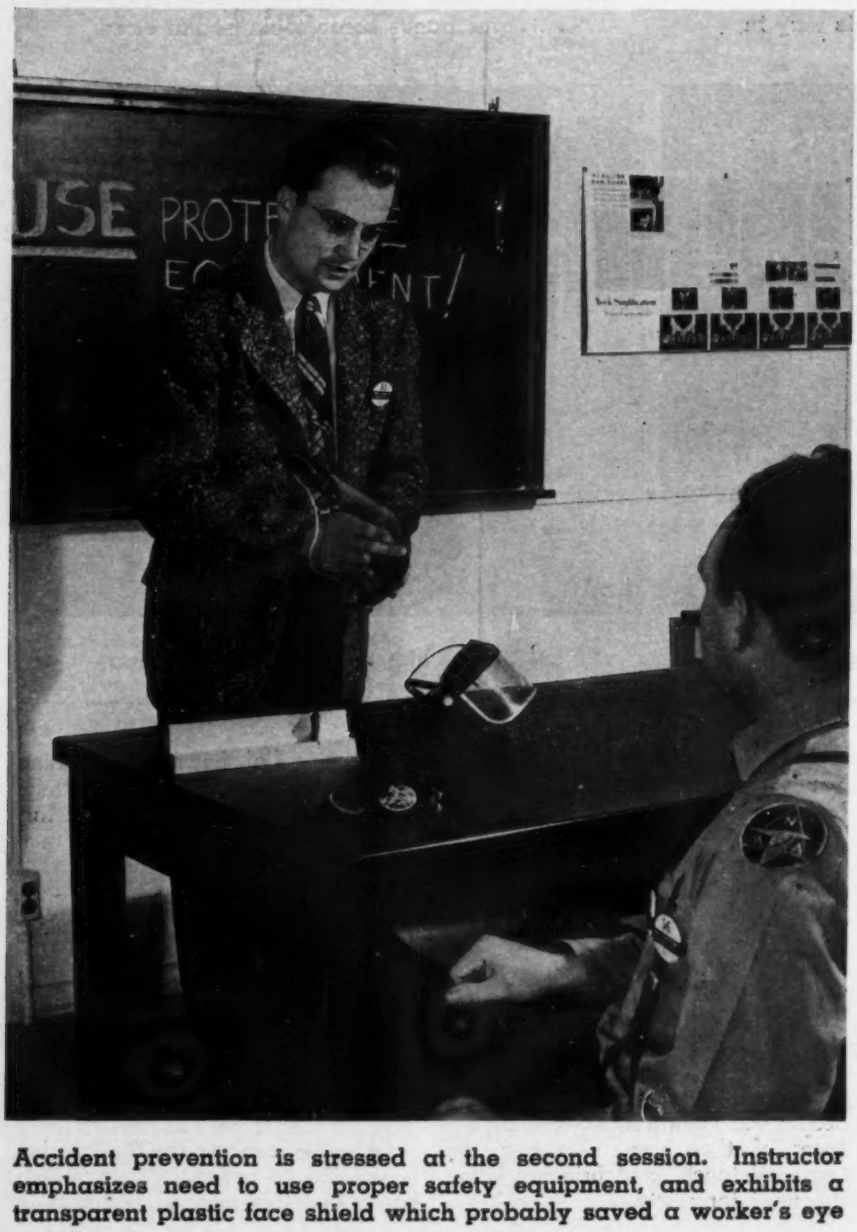
4. Good Work Habits

Because the employee has been on the job for at least a month and has learned a great deal about his own work and the department, the fourth session lends itself well to the subject of good work habits. By this time he is qualified to judge whether he is making use of good or poor work habits, and the instructor invites "self-criticism," which is usually more severe than criticism from fellow-workers. No list of rules is given, but discussion develops around the company rating chart; it is easy to make the group see that the employee with the best work habits is almost invariably the one with the high rating.

For example, on the chart the items of accuracy, care of equipment and working space, handling of material, use of working time, and speed are all heavily weighted. If the employee has established for himself certain rules of "good housekeeping," he may be reasonably sure that he will rate well on these points. He will have his tools handy, which will tend both for speed in his work and good care of equipment and space; he will make maximum use of his time.

During this meeting it is possible to review company regulations that pertain to work habits; these include the rule against smoking in the plant, the necessity for reporting to first aid when even minor injuries occur, the penalty for failure to report absences, and many others. A number of helpful suggestions and ideas are usually developed through group discussion, and frequently by the close of the meeting all important "do's and don't's" have been covered without quoting rules. This procedure works much better than any review of regulations, since it encourages the employees to set their own high standards.

The film used at this meeting depicts the total destruction of an industrial plant through a fire caused by carelessness of workers. The loss to each individual is stressed by showing that the factory was closed and all employment was terminated—thousands of dollars, thousands of man-hours, thousands of jobs were lost, because some one person or several people were careless.



Accident prevention is stressed at the second session. Instructor emphasizes need to use proper safety equipment, and exhibits a transparent plastic face shield which probably saved a worker's eye

5. Work Simplification

By the fifth session the subject of work simplification can profitably be introduced. It has been found that any discussion of this subject prior to the fifth or sixth week of employment is largely wasted because the employees are not sufficiently familiar with the plant as a whole or with their own jobs to apply properly the principles demonstrated. This results in having most of the lecture go "over

A month on the job conditions the new worker for there is time only to discuss the most elementary a quick shot of work simplification. Obviously, principles. Here, a demonstration of work areas

their heads." When the material is presented subsequent to the introduction of the other subjects, the group is found to be more receptive.

Work simplification is a natural follow-up to the subject of good work habits; it demonstrates in a practical manner how the employee can make his job not only more efficient (thus increasing his rating for quantity and quality of work) but also less fatiguing and monotonous. Any employee who analyzes his job to see where it can be "simplified" and where he can save motions, is going to find that job more interesting and more of a challenge to his ability. The so-called "worst job in the shop" is often the one with the greatest possibilities for simplification; when an employee is encouraged to work out his own improvements, his interest is increased and his pride in his accomplishments aroused.

It is obvious that a one-hour session on work simplification permits nothing more than a brief discussion of the most elementary principles. However, a workbench has been developed by the instructors to demonstrate the normal and maximum work areas. Examples of simplification in the kitchen at home are used for illustration, because the women are well acquainted with the thousands of steps involved in getting a meal, and can easily understand how elimination of one or two operations can save time, energy, and wear and tear. Examples of poor practice in manufacturing are related, and the group members are invited to volunteer suggestions for improvements.

For instance, the instructor tells about a drill press operation where a box of 200 parts was brought to the worker and placed on the floor. The employee bent over, picked up one part, drilled a 2/16-in. hole, changed chucks, drilled a ¼-in. hole, and finally placed the part in another box on the other side on the floor.

The instructor then asks the class how work simplification could be applied. The first and most obvious suggestion is to raise the boxes to table level, and this is usually suggested immediately. The next idea is to drill all holes of the same size in all the parts before changing the chuck; the third, to place both boxes on the same side; the fourth, to use a jig and perhaps do several parts at one time; and the last, to put a pulley on the spindle and operate with foot pressure, thus leaving hands free for continuous placement and removal of work. Almost always each of these ideas is mentioned by someone in the class.

This type of job is sufficiently simple to indicate to the members of the group that work simplification is undoubtedly applicable on each of their jobs as well.

North American has a suggestion system which provides for awards from $5 to $500 in War Bonds and Stamps

Also exhibited at session on work simplification is a semicircular workplace with bins arranged to simplify assembly operation, increase speed, and lessen operator fatigue. "Mr. Smith" tries it out

to employees who suggest ways and means to improve a job or procedure. The instructor points out that each employee can earn an award as well as make his work easier if he will study the possibilities of work simplification.

The film used for this lecture is one we have prepared; it shows a number of jobs in aircraft and other industries as they were originally performed and as they are after simplification. Before the instructor shows the film, it is customary to tell the group about one of the jobs and to ask for suggestions. Since the suggested improvement is usually incorporated in the film, this gives the group members an opportunity to see their own ideas in use and to visualize the process of development on the other ideas.

At the conclusion of the meeting each employee is given a little card designed to serve as a reminder of the work simplification principles, and the number of these cards returned in worn condition with a request for a replacement, indicates that much use is made of them.

6. Review

The sixth and final session is designed to review the highlights of the preceding five meetings, to remind the employees of the importance of abiding by rules and regulations, and of the necessity for striving for job improvement. As at the first lecture, a quiz is given, and all points of information that have not been absorbed are discussed as fully as time will permit.

The educational section maintains an accurate record of the questions answered erroneously and also a tabulation of suggestions made by the employees. This makes it possible for the instructors to emphasize any point that apparently is not being properly "put across" in the sessions, and gives an instant check if errors rise above an established norm.

All worth-while suggestions—and we have found by far the greatest majority of ideas are good—are passed on to those departments where they are applicable. Thus many new employees see their ideas put into operation and are encouraged to work toward job improvement.

So You Won't Lack Paper—Conserve It

AN UNSUSPECTED THREAT to production confronts industry in the prospect of an imminent shortage of all wood pulp products with special emphasis on commercial papers. Vital paperwork in the plant may be brought to a sudden halt unless industry begins now to conserve with the utmost thought and care.

Paper *is* a strategic material. Formerly it was taken as a matter of course. But so, once, were rubber, steel, copper, and aluminum. Today a definite scarcity of paper is clearly visible. Its uses have increased vastly. Yet potential wood pulp production has been clipped by manpower and transportation limitations. And the war has chopped off the Scandinavian imports which, in peacetime, constituted more than 70 percent of our total supply.

Industrial managements are among the consumers who can least afford to take paper for granted. Think it over. An absolute lack of paper could all but stop a plant cold. Without letterheads, you can't write for quotations. Without purchase forms, you can't place orders. Without time cards, payrolls, employment records, billheads, production records, continuous forms, memoranda, blueprints, and so forth, it would be well-nigh impossible to keep the plant or office running.

Yet in the case of commercial paper alone—and this is the type most needed for management's purposes—1943's huge demands will outweigh the prospective supply by nearly 40 percent. Worse still, rising governmental requirements will leave for industry in 1943 an amount equal only to about 50 percent of its 1942 consumption.

Were it not for the fact that great savings have already been made by industry, by newspapers and magazines, by the government, and by WPB's curtailment of less essential paper products, many experts believe we would now be gripped by an unprecedented and crucial shortage.

Offsetting the greatest savings, however, are war's tremendous new demands. Vast quantities of paper are being shipped overseas, never to return to the domestic waste market.

Meanwhile, the forward march of war-born substitutions goes on at home. Each takes a mighty share of our total wood pulp supply. Paper and paperboard containers have, in the last year, done the duty of 215,000,000 pounds of metals, 750,000 pounds of glass, and 12,000 pounds of rubber.

Convinced, then, that a serious shortage impends, good management will ask only two questions:

1. What is being done to conserve paper?
2. What *can* be done to conserve paper in the plant and office?

Some of the most spectacular savings of all have already been accomplished by the federal government itself. Strange as this may seem to the management man whose own dealings involve such a heavy paper traffic with Uncle Sam, the federal agencies have reduced inventories, trimmed specifications, and cut out non-essentials with total savings that run into the hundreds of thousands of tons.

How To Save

At all events, the government takes only about 10 percent of the total wood pulp supply, even though its consumption of commercial paper is a lion's share of that particular market. Since industry consumes *all* kinds of paper, and paper products, let us see what savings are being made elsewhere—and by what methods.

The business and industrial publications (magazines such as FACTORY) have reduced their use of paper by at least 10 percent. The trim sizes have been lessened, and stock of much lighter weight is being used. These reductions, proposed by the publishers themselves, are being accurately checked by a duly constituted agency. Even without reductions, the total consumption of paper by the business publications was a remarkably small part of all paper consumption—less than four hundredths of one percent.

An outstanding example of the ability of private enterprise to conserve is furnished by this year's telephone directories. The Washington, D. C., telephone book is a good case in point. Currently it numbers only 712 white pages, against last year's 968, and it weighs only 3⅜ pounds, against last year's 4¼. *Yet it contains 7 percent more listings!*

How was this done? Primarily by printing four columns of type to the page instead of three, by condensation of type, by smaller margins, and by tighter abbreviations. These are principles that can be applied to almost any form of printing.

An even more important principle in the conservation of commercial paper, however, is the *downgrading* of paper qualities. Experts believe that the majority of papers used in the keeping of industrial records and correspondence are much heavier and better than they need be for the purposes they serve. This is true also of plant magazines and newspapers, Army-Navy "E" award programs, circulars, and the like. Here are five guiding questions which every management should ask about every piece of written or printed matter which it orders and uses:

1. Is it necessary?
2. Can lighter paper be used?
3. Can a smaller size be used?
4. Can the *number* of printed pieces be reduced by pruning distribution lists?
5. Is an excessive inventory of paper on hand? (Sixty days is today's allowable margin—6 months the peacetime average.)

War Production Board officials urge every top management to make a competent operating executive responsible for the application of these principles in each plant. And here is a brief check-list for the further guidance of the paper-saver:

1. Use 8½x5½-in. letterheads for short letters; inclose them in small envelopes.

2. Review all printed forms periodically for essentiality; consolidation; elimination of waste space; standardization of sizes, weights, color, grade; elimination of color where possible.

3. Use smaller type sizes and margins. (Any competent printer, in consulation, can point the way to pronounced savings by these means.)

4. Cut the *weight* of paper stocks. (You tell the printer how long you expect a record to endure and he can tell you what stock to order.)

5. Condense letters and memoranda by (a) keeping margins as narrow as possible; (b) sticking to single-space forms; (c) using reverse side of incom-

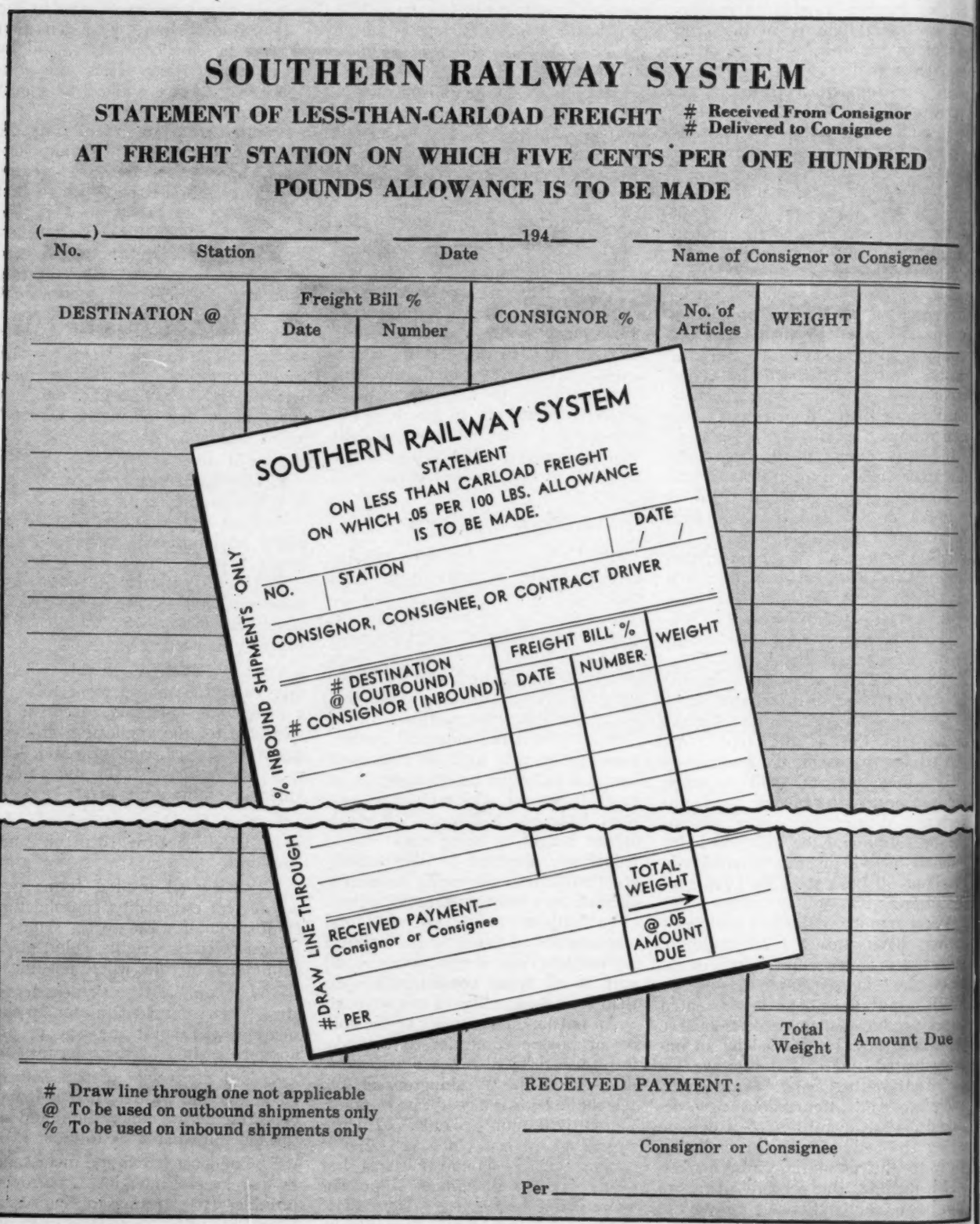
ing letters as first carbon copy of replies; (d) using reverse side of second sheets for carbon copies; (e) using both sides of all mimeographed sheets.

6. Control disbursement of paper supplies to employees so that excessive quantities do not accumulate in desks and departmental supply closets.

7. Make scratch pads from stocks of obsolete letterheads, memorandum forms, and other unused inventory.

8. Use and re-use carbon paper consistently.

The above list could be a little more elaborate. But any management which adopts these few simple practices will be covering nine-tenths of its opportunities to conserve a very important commodity at a very important time. In peacetime conservation—and economy—are plain good management. In wartime they become an urgent obligation, vital to victory.



SOUTHERN RAILWAY SYSTEM

STATEMENT OF LESS-THAN-CARLOAD FREIGHT # Received From Consignor # Delivered to Consignee

AT FREIGHT STATION ON WHICH FIVE CENTS PER ONE HUNDRED POUNDS ALLOWANCE IS TO BE MADE

(_____) No. _____ Station _____ 194____ Date _____ Name of Consignor or Consignee

DESTINATION @	Freight Bill % Date	Freight Bill % Number	CONSIGNOR %	No. of Articles	WEIGHT	

SOUTHERN RAILWAY SYSTEM

STATEMENT ON LESS THAN CARLOAD FREIGHT ON WHICH .05 PER 100 LBS. ALLOWANCE IS TO BE MADE.

% INBOUND SHIPMENTS ONLY

NO. | STATION | DATE / /

CONSIGNOR, CONSIGNEE, OR CONTRACT DRIVER

# DESTINATION @ (OUTBOUND) # CONSIGNOR (INBOUND)	FREIGHT BILL % DATE	FREIGHT BILL % NUMBER	WEIGHT

#DRAW LINE THROUGH

RECEIVED PAYMENT— Consignor or Consignee

PER

TOTAL WEIGHT →

@ .05 AMOUNT DUE

Total Weight | Amount Due

Draw line through one not applicable
@ To be used on outbound shipments only
% To be used on inbound shipments only

RECEIVED PAYMENT:

_____
Consignor or Consignee

Per _____

"Before" is the big form, "after" the revision in center. Paper saving: 60 percent. Essential data intact

Lessons in Motion Study Turn Up Better Methods

E. R. WHITTAKER, Work Simplification Department, Winchester Repeating Arms Company, New Haven, Conn.

MORE PRODUCTION, but no sacrifice in quality—that was what we were shooting for. And we planned to achieve our objective by applying principles of work simplification, which train men to think creatively toward the better use of materials, time, and energy.

One hour each week, for five months, 100 supervisors, foremen, and technical men attended meetings to learn these principles, practical ways to carry them out, and the tools to use to do the job.

At the first meeting a brief history of work simplification, citing the achievements of the men who helped develop it, indicated the direction the program would take.

In succeeding sessions the usefulness of the process chart as a tool in work simplification was emphasized by asking each member of the group to make a chart. Approximately 50 percent of the men handed in a process chart on some chore at home or some operation in the shop. Some of them resulted in outstanding savings in labor, time, energy, and money.

One of the most noteworthy improvements resulted from the practical application of a process chart worked out by two men in the cartridge division. Questioning the necessity for the wash-and-dry operations on three types of bullet covers, they discovered that by installing a small gadget they could prevent the oil drip that made the operation necessary. The resultant savings from this process chart totaled six operations, six transportations with 945 feet of travel, seven storages, and eleven pick-ups and lay-downs.

The second tool of work simplification, the man-and-machine chart, was studied, and its value as an indication of idle time of both men and machines was stressed. The difficulties of solving a problem by mathematics, and the comparative ease with which it could be solved with the aid of a man-and-machine chart, were demonstrated. A film showing a machine with a speed of 24 r.p.m. fed by one operator indicated that the operator could easily feed two machines.

The third tool of work simplification, the right-and-left-hand chart, was introduced to the men. The analysis of a film on a shop operation, projected frame by frame, gave the students a chance to make their first charts. Here a man from the gun assembly shop made an outstanding contribution by simplifying the subassembly of a rifle trigger, which consisted of assembling a sear and sear pin to the trigger and staking the

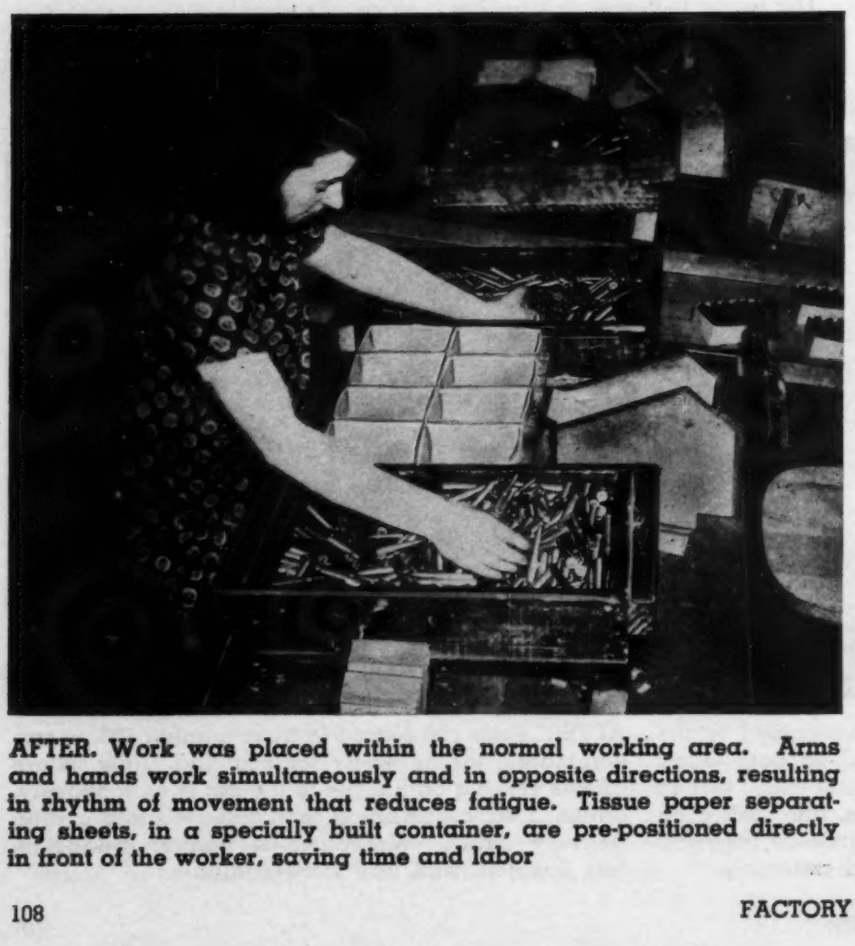
RIFLE TRIGGER SUBASSEMBLY

BEFORE. Sear and sear pin are assembled to the trigger, and the sear pin is staked on both sides. Formerly the pin was staked on one side, turned over, transferred to another position, and staked on the other side. There were no containers for parts and no receptacles for the finished assembly

AFTER. Parts are placed in trays holding 100 pieces, eliminating the necessity for counting. New fixture allows staking both sides of the pin simultaneously. Finished subassembly is then released into a drop delivery chute. Workplace is neater; production has doubled, with less worker fatigue

PACKING CARTRIDGES

BEFORE. Totebox in front of the girl caused an excessive amount of reaching outside the normal working area, resulting in unnecessary fatigue. There was no standard location for the tissue separating sheets, which were difficult to remove from the container. A study of the individual worker's physical capabilities shows how to lay out a workplace—as the illustration below plainly indicates



AFTER. Work was placed within the normal working area. Arms and hands work simultaneously and in opposite directions, resulting in rhythm of movement that reduces fatigue. Tissue paper separating sheets, in a specially built container, are pre-positioned directly in front of the worker, saving time and labor

sear pin on both sides. He designed a tool that staked both sides simultaneously, and provided bins, trays, and drop delivery for the assembled trigger, thereby saving nine operations and doubling production.

The session on fundamentals of hand motions emphasized the importance of recognizing each individual operator's physical capacities before setting up the job or workplace. Having each man sit down at a table and draw his normal working area by describing arcs with both arms brought out this point clearly. The importance of rhythm of movement and habit was stressed. These discussions were coordinated with lessons in job layout. The practicability of planning a job in detail before production is started, and maintaining that plan for the duration of the job, was demonstrated.

Time Is Important

Special attention was directed towards the importance of time, today and every day for the duration. Methods of training new employees were discussed, and timesaving suggestions on different operations were considered. The *efficient* foreman was contrasted with the *busy* foreman who had no time to be efficient, by showing a humorous sound film entitled "The Busy Foreman."

The section of the program dealing with plant layout was enlivened by presenting a concrete problem which existed in the plant. The floor plan of one of the rooms, set up in a haphazard fashion, was outlined. Each group made a new floor plan, using the principles of work simplification.

The meeting concerned with safety was illustrated by a film showing the usual shop hazards and a motion picture film in color of safety appliances available at Winchester. Various safety devices were on exhibition at the meeting, and an explanation of their uses by the plant safety engineer was of great interest to the men.

The final meeting of this work simplification program was held in the Winchester clubhouse. First there was a dinner, with accordion music and singing. Then, at the meeting which followed in the gymnasium, recognition was given those who had made outstanding contributions as a result of the program, by showing films of the improved operations and their authors. These films proved valuable in demonstrating to management the value of the program. And special letters of appreciation from the works manager to those who has furnished the best suggestions were presented.

Wanted: Incentives for the Production Front

WHITING WILLIAMS, Consulting Editor, *Factory*

"Those managers are right who claim that a shift back to incentive pay could today so increase the worker's output as well as his weekly 'take-home' that the Little Steel formula would not be upset, and in addition, go far to eliminate the present demand for more men"

A YOUNG RED outside a big steel plant plant in Soviet Russia's Donets Basin was telling me about Bolshevism's achievements:

"One single new device invented by us Communists is by itself enough to carry us far beyond all capitalist countries. Whereas they pay all workers the same wage(!), we here have hit upon an infinitely better, more productive plan. We call it *payment by results* or *piece rate.*" (!)

Some years before in a Wales Rhondda Valley mine, I had listened for hours as the local "Bolshies" argued hotly that "piece rate do be the tool of the Masters for playing one wage earner off against another and so destroying the unity of the working class. Like our comrades in Russia, we should 'ave naught to do with it!"

Payment for Results

Incentive payment is, or course, diametrically contrary to Communism's original, basic formula, "From each according to his ability; to each according to his need." Nevertheless, Lenin quickly perceived that to make his new social order properly productive, he had not to pay according to need, but to results—and not only in the factory but also on the collective farms. Piece rate, accordingly, has for many years been more widely used in Soviet Russia than anywhere else in the world!

But, until several years after Lenin died, the Soviet Republic saved its Marxist face by insisting that it was wicked to pay any real differentials either for skill or for responsibility. When, however, Stalin tackled the job of making his heavy industries strong enough to repel invaders, he had to throw this Communist idea so far out the window in '32 that ever since these differentials have actually exceeded those of virtually all capitalistic nations. He also deprived of practically all their former power the rank-and-file committees which long had interfered with discipline in factory and army. Most important of all, he created in soldiers and citizens alike the indispensable fighting spirit by persuading them that they were working and fighting, not for the "Worker's Revolutionary Internationalism" so fanatically proclaimed by Lenin and Trotzky, but for the preservation of their beloved Mother Russia!

The reason Russia's armies have lately staged one of the world's most astounding miracles is fairly simple. It is because Stalin has done some Class-A thinking about incentives. Not only did he perceive that it takes one kind of incentives to cause a revolution and a very different kind to make the new, post-revolution set-up operate effectively. He also had the intestinal fortitude to make the complete about-face that this vast difference requires of the leader.

If you want to stage a revolution, you can't find a better means than Karl Marx provided.

"Labor," so preached Lenin, with Marx's Manifesto under his arm, "is the sole creator of worth and wealth. If, therefore, you labor in this factory or on this farm, then you give to it all the value it possesses. This means that you and your fellow-laborers own your factory or your farm. We'll later send you word as to the day when you are to take it over and liquidate its present so-called owners!"

Perfect—except for the fact that when "labor" takes the successfully "revoluted" national plant over, it has a heck of a time to make the damn thing go! Not only does it lack the brains and know-how for operating the metallurgical, chemical, and similar industries, but it has also been taught to hate as a near-traitor every individual who possesses the needed training.

That's the moment of the Great Test—the demand for a big about-face-quick! If the leader's name is not Steel (Stalin), it had better be. Today Russia is an industrial and military power to be reckoned with because Mr. Steel met that test. Instead of continuing to starve and shoot his production experts and technicians, he proclaimed their crucial value and started shooting, instead, those "old Bolshevists" who fought him simply because they'd rather see their whole experiment fail than abandon their beloved Marx. When victory comes to the United Nations, it will be largely because hard-headed Stalin had both the brains and the guts to make history's biggest change-over from the incentives required to cause revolution to those demanded for transforming the new, blood-won industrial and military apparatus into a going, victorious concern.

Further From Victory

Meanwhile, that same victory is postponed because we here in America have, during the same years, been told by our government and most of our labor leaders that payment by results is wicked, differentials for skill and responsibility are undemocratic, salaries and incomes over $25,000 are unsocial, and all possessors of above-minimum equipment are to be distrusted as potential, if not actual, traitors!

Today our war production suffers from absenteeism, featherbed restrictions, jurisdictional ond organizational strikes, and from an industry and business plagued for political reasons because we are confused. The reason

(*Continued on page 210*)

TWO PLEDGE

The Line of Organization

To promote cooperation, mutual understanding, increased production, and quality, in all my relations with those *above* me who look to me for *results*, I pledge myself to:

1. *Understand and carry out all company policies and procedures.*
2. *Know where the work for which I am responsible stands at all times.*
3. *Be constantly alert to see that quality standards are maintained and methods improved.*
4. *Go out of my way to help others.*
5. *See that the person above me in the line of supervision is informed as to what goes on; check with him if I am in doubt.*
6. *Keep an open mind on new ideas, methods, people, and problems.*
7. *Stand on my own feet and not pass the buck.*
8. *Follow up my instructions to see that they are being carried out.*
9. *Develop and build those under me so that I shall always have an understudy.*
10. *Meet each day's problems cheerfully, with patience, persistence, reasonableness, and understanding.*

To do these things because only in this way can I merit the confidence and respect of those who have intrusted me with my responsibilities.

Prepared by A. L. KRESS, Assistan Pres

GE OR FOREMEN

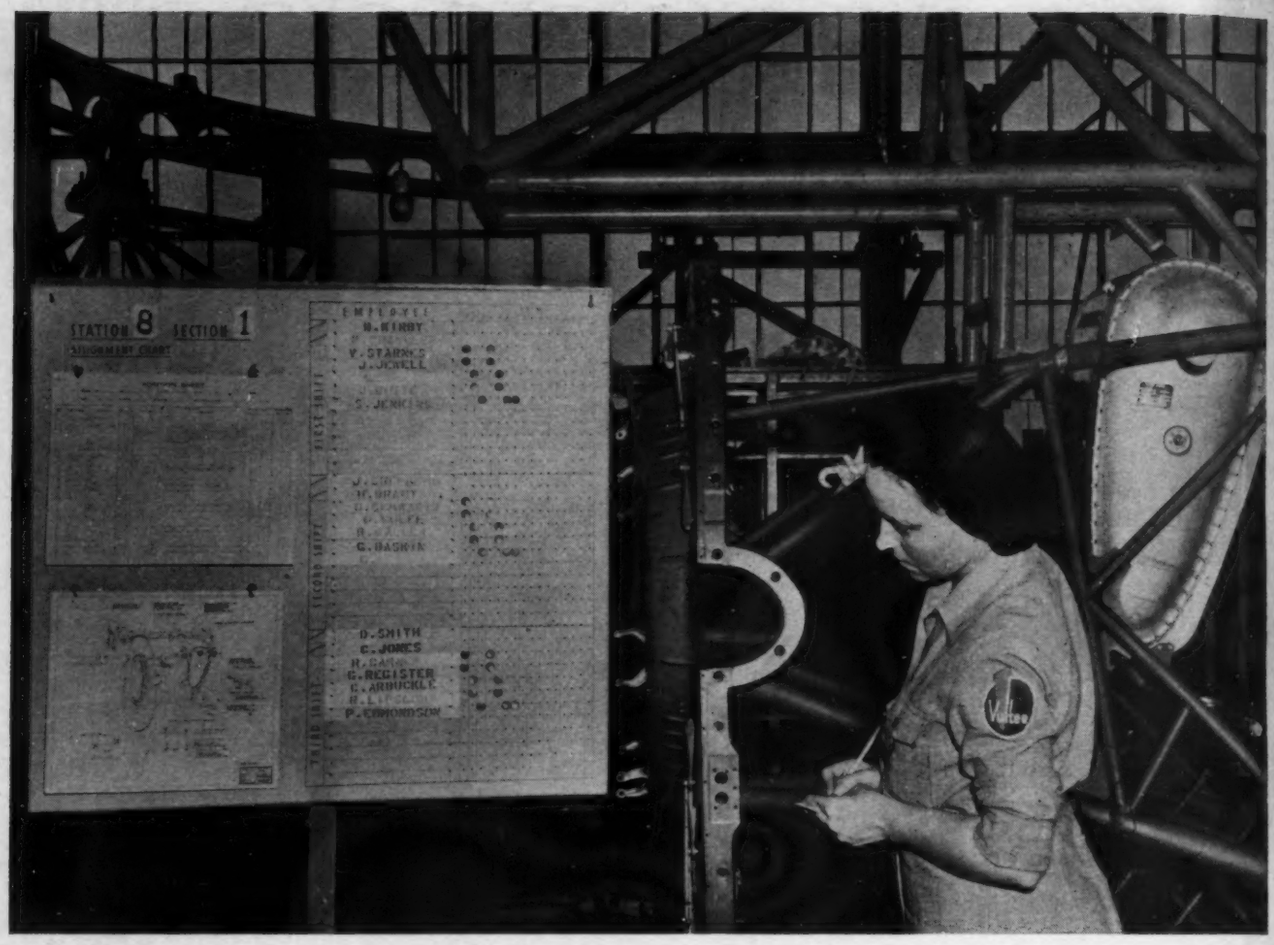
The Line of Leadership

To promote cooperation, good will, and mutual understanding, in all my relations with those *under* me who look to me for *direction* and *instruction*, I pledge myself to:

1. *Take a personal interest in them by making a friendly contact at least once a day.*
2. *Explain all company programs and policies to them.*
3. *Get and keep their confidence so that they will always feel free to come to me with any problem or misunderstanding.*
4. *Play no favorites.*
5. *Get all the facts before I act and not jump at conclusions.*
6. *Give full credit to others when it is deserved.*
7. *Never discipline a person in front of others.*
8. *Sell quality of workmanship and safety every day.*
9. *Never promise things I can't deliver.*
10. *Treat the other fellow the way I should like to be treated in his place.*

To do these things because I still remember when I was once where they are now, and because I want to help them do their jobs well. Only through *them* can I do *my* job well.

istan President, Republic Aviation Corporation



"Victory Boards" contain all the information usually directed at the worker from a variety of sources

Assignment Boards Tell What to Do, How to Do It

J. M. DRULINER, Chief of Methods and Controls, Vultee Aircraft, Inc., Nashville

To FIT INEXPERIENCED WORKERS into accelerated production schedules, Vultee is making use of a new device called the "Victory Board." Containing practically everything new employees need to know about their jobs, the boards are playing a far from minor part in helping us get more production with fewer headaches.

During the past year or so, thousands of totally inexperienced men and women have been absorbed into industry. How to fit these workers into the accelerated schedules that the war effort calls for? Each job on the assembly line requires knowledge —knowledge that must be imparted by someone, quickly and intelligibly. Foremen and leadmen have used millions of words and a lot of breath trying to get across to the workers in their charge just what to do and how to do it.

Vultee has a better way—the Victory Board. Here all the information normally directed at the worker from a variety of sources is combined into one easily read and quickly available reference.

On each board are three charts. A perspective drawing or photograph of each part acquaints the worker with the "look" of the job. The "assignment" section, arranged daily by the foreman, assigns each worker to a specific job by a system of movable tags. The "position" sheet refers to the drawing and job or item number; lists parts and quantities required for the job, and sources of the parts; shows needed tools, best sequence of operations, number of people required; and notes standard times and inspection requirements.

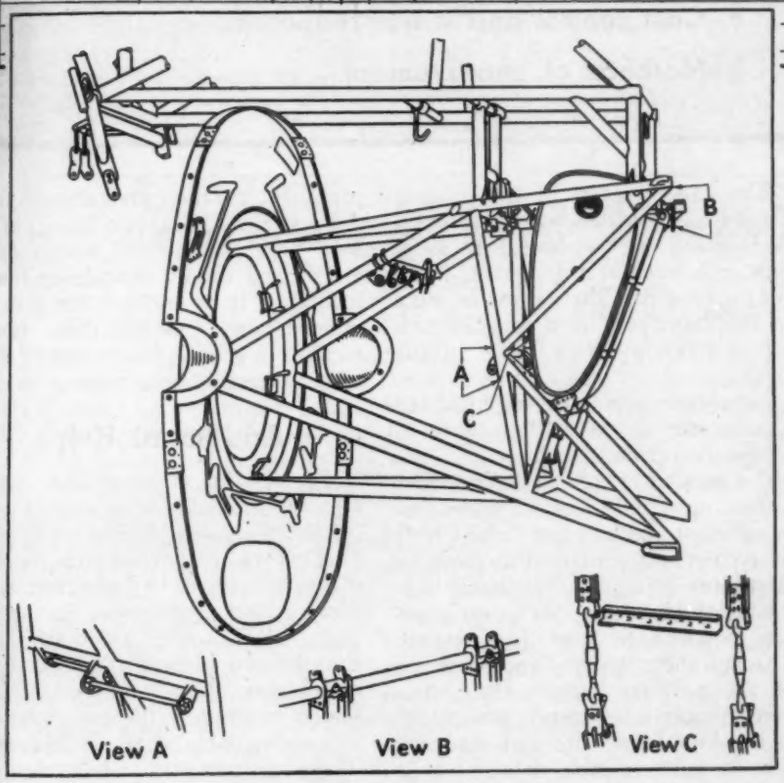
Every worker at a given station on the assembly line has a nameplate posted on the chart beside a numbered list of the jobs at this station. A quick glance at the red disks hung beside his name tells just what jobs have been assigned to him. Take Bill

POSITION SHEET

MODEL V-72 SECTION 8 ACCOUNT 4000 100 PAGE 1 OF 3 DATE

DEPARTMENT 65 STATION 1 POSITION 1 EFFECTIVE ON SHIP 4436 AND UP

No.	Part Number	Description	R	C	E	Work Guide: Tools Rec'd.	Work Guide: Operations	Men Req.	Man Minutes: Est.	Man Minutes: Act.	Elapsed Time: Est.	Elapsed Time: Act.
	-Job 1-											
	DYNAFOCAL SUSPENSION											
	REF: 72-58003							1		38.21		38.21
							OPERATION 1					
7	SU-2L5	DYNAFOCAL			X	5/8" BOX	Disassembly by removing					
		MOUNT				WR.	two cotter pins, two					
						5/8"	nuts, two bolts from					
						SOCKET	each dynafocal. Send					
						SPEED	part of dynafocal that					
						HANDLE	attaches to engine to					
						DIAGONALS	Sta. 2. Install other					
							part on motor with lord					
							bolts, washers, nuts -					
	-Job 2-						safety with cotter pins.					
	DIAPHRAGM											
	REF:72-58003 &							2		63.26		31.63
	72-50016						OPERATION 1					
1	72-50016	DIAPHRAGM		X*		3/8" OPEN	Bolt diaphragm to mount					
14	AN520-10-7	SCREW	FL			END WR.						
14	79HM-02	NUT	X			SCREW-						
						DRIVER						
							OPERATION 2					
2	VS325-803	ROD ASSEM		X		3/8" BOX	Attach one rod to 72-					
2												



Above, a portion of the position sheet, and, left, the three-dimensional drawing that hang on the assignment board shown on the facing page. The position sheet lists parts and quantities required; sources of parts; tools needed; best sequence of operations. For illustrative purposes parts numbers have been removed

Jones, for instance. He has been working a couple of months—long enough to get the general idea, but not long enough to rate as an experienced employee. He comes in and finds three tags beside his name—jobs 2, 3, and 4 at his station. He has never done any of these jobs before, so he looks at the chart to see what is called for. Job 2 is easy enough. Job 3 is tougher, but the instructions on the position sheet explain the work. Job 4 is something entirely new to Bill, and quite complicated. He decides to ask his leadman for some help before he tackles that one. But his study of the position sheet helps him to know just what to ask, and he wastes no time in trying to explain what he wants to know.

Supervisors, workers, and inspectors all agree that the charts supply at a glance information that used to take hours of verbal instruction.

One of the most popular features of the boards is the photograph or drawing of the finished part. The new employee is able to see what his work should look like.

Aside from the obvious advantage of telling every worker what to do and how to do it, Victory Boards provide encouragement to the workers. When a division manager sees a job especially well done, he can, by a quick look at the board, know which of his workers is responsible, and pass along the word of praise that shows he has noticed the extra effort.

Quick Course for Foremen

M. F. STIGERS, Division of Education and Applied Psychology, Purdue University

GREATLY INCREASED PRODUCTION calls not only for better methods but also for more workers. More workers call for more supervision. When a manufacturing organization increases its personnel to several times its original number, there is the immediate problem of selecting and training many new foremen and supervisors. This question confronted the Perfect Circle Company, Hagerstown, Ind., when its original contracts for airplane-engine piston rings were tripled and quadrupled and increased yet again.

The company decided, therefore, to put on an intensive supervisory training program to include present and prospective foremen and assistant foremen. Present foremen were included because new conditions and a new product made some training necessary, even if it were assumed that they were already good foremen under the old conditions.

I had conducted several series of conferences with foremen and management of this organization, beginning in 1938. I knew and was known by a fairly large number of Perfect Circle employees. As a result of this former contact and experience, it was arranged that I was to assume the responsibility and labor of conducting a training program, following plans made jointly by myself and a management committee.

Topics for Discussion

1. Qualifications, responsibilities, duties, and opportunities of foremanship
2. Training new and present employees
3. Obtaining complete worker cooperation
4. Process of piston-ring manufacture
5. Product specifications and inspection standards
6. Company policies, labor contract, standard practices, and wage computation
7. Grievance prevention and handling
8. Cost control and waste reduction
9. Methods of improvement

Twelve-Week Course

The over-all program was to cover a 12-week period, the first week of which was to be spent in planning and organizing the training, assigning persons to groups, and scheduling the groups for the day and hour of meeting. Actual training was planned to cover 11 weeks. Wednesday, Thursday, and Friday of each week were assigned to the program. The number of persons involved was approximately 210. Of these about 80 were present foremen and junior executives, and the rest were prospective foremen and assistant foremen. In the prospective foremen group were included employees whose superiors had recommended them for this opportunity, and others, recently employed, who had been selected on the basis of possessing leadership qualifications.

The 210 members of the training program were divided into nine groups. Each group was scheduled to meet once each week at a designated hour. For the most part, these meetings were on the employees' own time, preceding or following their shifts in the plant.

Nine discussion topics were selected for the eleven weeks. Two were to occupy two periods each.

The minutes of each conference were written up, proofread, and reproduced in sufficient numbers to furnish a copy to every participant in the program, as well as to every management person. A folder was given to each person in which to keep these reports. Through these steps a complete record of the program became the permanent property of every participant, giving him immediate and ready access to some valuable data.

Observation of persons who had participated in one or more series of discussions had led me to hold some definite beliefs. One was that some sort of follow-up of the conferences was necessary. Unfortunately, mere participation in a good conference where sound conclusions are reached, does not guarantee that the participants will use the conclusions in their daily work. It is one thing to sit with other people and reason deliberately and calmly concerning fundamentals. It is another thing to remember and practice these fundamentals in actual performance of daily tasks, especially under pressure.

Additional Helps

To aid in assuring that lessons learned in conferences were applied on the job, two devices were used. One was a written assignment relating to the topic, to be turned in by every person participating in the program. This assignment called for thought and effort on the part of the person soon after the conference, and served to impress the principles and various valuable data on his mind. These assignments, when returned, were distributed among top management (for example, general foremen or superintendents) for checking.

The second device used was the individual interview. Approximately 110 persons were chosen for three separate half-hour interviews with me. These selected persons included all the present foremen, plus a limited

number of prospective foremen. The three interviews for each person were scheduled at appropriate intervals over the last 10 weeks of the program. In these personal interviews, matters of a more private and confidential nature were discussed. I was, in most cases, furnished with advance information concerning the strong and weak points of each man interviewed. These points were approached by first asking the person general questions which directed his attention to the trait involved, and included a question as to his own estimate or rating of himself on that trait. Finally, mention was made of how others (always unidentified) rated him on the trait in question. Whether or not the person conceded a weakness, there was always agreement on the necessity to watch himself more closely in that respect.

Each private interview offered opportunity to those interviewed to make constructive criticism of persons, policies, and conditions. Many irritating and annoying things were uncovered. It was my responsibility to follow up and investigate. On some occasions it involved constructive criticism of improper practices on the part of management. Some were discovered to be irritating or destructive of morale, and these were stopped.

Not all the things complained of were found to exist as described, and not everyone was completely satisfied. Yet much good was accomplished. If nothing else, persons interviewed were brought to think frequently of themselves, of how they were handling their jobs, and of how others regarded them. Most of them made a noticeable improvement.

Weekly Meetings

One of the features of this training program was a weekly meeting with a large group of senior or top management men. In these meetings two things were done. The first was to discuss the results of the preceding discussions on the scheduled topic. The reactions of the groups were given fully (no individuals were referred to), always including any where management was said to be at fault. On a number of occasions the management group agreed that the criticism of the supervisory groups was well taken, and that corrective action should be taken.

The second purpose was to supply the data that I needed for handling the next topic. This was helpful, because a person who is not a full-time member of the organization cannot possibly know local conditions and the many small but important departmental details that affect performance. Sometimes facts presented by one member of the management group were news to, or at least not understood or appreciated by, others in the group.

One of the results of the training program was the definite increase of knowledge and understanding gained by those who attended. Facts were presented that had never before been brought out, or were presented more fully and clearly, with supporting evidence. One illustration of this was the discussion of factory processes, when some men learned for the first time how their jobs fitted into the whole plan. The "reason why" was stressed throughout the entire program, and aided tremendously in improving the understanding of the participants. Besides the improved understanding, there was higher morale as a result of knowing and understanding, and of being trusted with explanations never before offered.

Another good result was the improvement that comes to a person who is led to analyze his own shortcomings and his imperfect performance, and to realize that his associates and superiors are critical of him. In my opinion, a majority of the men participating in the program sincerely

(*Continued on page 218*)

Personnel Helps for Foremen

1. A. W. O. L.

THIS is a funny country. Some guy invents a word. A newspaper prints it. A radio commentator uses it. Then it's on the hit parade—tenth—fourth—first! By this time, it's so loud you forget what it means—you only hear the noise it makes. They're making a noise like that now—ABSENTEEISM.

Don't let it fool you. It doesn't mean a thing, except that Johnny stays out. They want to solve it wholesale. "Let's stop selling 'em liquor." "Let's suspend 'em without pay." "Let's make 'em bring doctors' certificates."

Bunk! You're a foreman, you know better!

You know Karl Detzer stayed out last week to go huntin'. Sure, O'Connor goes on binges—but that's not why Lizzie Fischer stays home. You know cutting Karl's pay would hurt him—his wife is just about to have her fifth little Detzer. But what good would cutting Happy Gallup's pay do?

Look, mister. You don't have to crack your bean over national problems. You just worry about your own department—that's your job. You know these folks. You know how to handle 'em. Karl is sort of weak-livered. A good stiff reprimand ought to do the trick there. But if you tried that on Lizzie she'd probably walk out—or worse yet, she'd bawl. Thing to do there is to advise her about leaving that boy of hers with neighbors when he comes from school.

Gallup's a good guy. You can't reach him with threats or deductions, but he's got a heart as big as a B-17. Why don't you appeal to that heart?

Incidentally—that's something all your stay-away Lizzies and Gallivantin' Gallups have got—a heart. YOU KNOW THEY MUST NOT STAY OUT. YOU KNOW THAT IT ISN'T BECAUSE THE BOSS WANTS MORE WORK. YOU KNOW THAT ALL WE NICE SAFE FOLKS AT HOME CAN DO IS TO HAVE THINGS READY WHEN OUR FIGHTIN' YANKS NEED THEM.

TWO RULES

Study your worker and the cause of his absence and handle each case separately.

Never forget that you're dealing with an American with a heart as big as all outdoors.

Contributed by LEE MARION, Middletown (Pa.) Air Depot

Copies (4-page folder, 3x5 inches) available for distribution to supervisory forces. Prices on request.

Significant Labor Developments

Period Surveyed: March 10 to April 10

TREND INDICATORS

Executive Order to Curb Inflation

THE PRESIDENTIAL ORDER directs the Price and Food Administrators to take immediate steps to place ceiling prices on all commodities affecting the cost of living. No further increases in price ceilings are to be allowed except to the minimum extent required by law. Each Administrator is ordered to use to the fullest degree all the discretionary powers vested in him by law to prevent further price increases, direct or indirect, and profiteering, and to reduce prices that are excessively high, unfair, or inequitable.

Neither Administrator is barred from making any readjustment—subject to the general policy of the Economic Stabilization Director — for various commodities or classes, qualities, or grades, seasonal variations, on various marketing areas, or from authorizing such support prices, subsidies or other inducements as may be deemed necessary to increase production, provided such action does not increase the cost of living.

No further increase in wages or salaries is to be authorized by WLB or the Commissioner of Internal Revenue except such as are clearly necessary to correct substandards of living; nothing, however, is to bar these agencies from making such wage or salary readjustments as may be deemed appropriate in accordance with the Little Steel formula. Nor are the WLB or the Commissioner of Internal Revenue prevented from authorizing reasonable adjustments of wages and salaries in case of promotions, reclassifications, merit increases, incentive wages, or the like. Such adjustments, however, must not increase the level of production costs appreciably nor furnish the basis either to increase prices or resist otherwise justifiable reductions in prices.

The Chairman of WMC is authorized to forbid employment by any employer of any new employee or the acceptance of employment by a new employee except in conformity with regulations which may be issued by WMC with the approval of OES. The purpose of this restriction is to prevent employment at a wage or salary higher than that received by the new employee in his last employment, unless the change in employment would aid in the prosecution of the war.

The Belo Plan

Again the Belo doctrine is, in effect, upheld by the Supreme Court's refusal to review a lower court ruling. (Murray vs. Noblesville Milling Company.) The contract provided for payment of specified hourly and overtime rates which, supplemented by a weekly bonus, amount to a 60-hour week.

In further interpretation of the Belo doctrine, the court sustained a plan that guaranteed hourly earnings, although the "regular rates" of pay varied from week to week according to the number of hours worked. The hourly regular rate was in excess of the statutory minimum wage. (Green Head Bit & Supply Company vs. Hendricks.)

Another plan, however, which did not provide a *bona fide* reduced regular rate of pay, was held to violate the Wage-Hour Law. If the employee worked the maximum number of hours permitted by statute without more, his pay was the previously existing hourly and piece rates. If he worked more, 5 percent would be deducted from his regular rate in computing his weekly earnings plus overtime compensation. (Scott vs. Atlas Press Company.)

Offsetting Time

If two work weeks overlap, overtime paid for one work week may now be offset against overtime worked in another work week, provided they are in the same pay period.

Employee who works for two independent companies will be separately calculated, even though both employers are part of the same collective bargaining agency. (Rules of Wage-Hour Division.)

A lump sum contractor, deprived of his profit because of the added expense caused by the 48-hour work week order, may apply for relief, if he can show that compliance with the Order has resulted in an increased cost of performance or that such increased cost deprives him of his fair profit on the contract. Relief to subcontractors may be had only through prime contractors. If the contract covers a fixed-price article, any adjustment in excess of the ceiling must be approved by OPA.

Right to Deduct for Tardiness

Employers may deduct from the wages of a tardy employee double the time he is late (under Wage-Hour and Walsh-Healey Acts), provided only that such deduction does not reduce the employee's wages below the statutory minimum rate. (Ruling of Administrator.)

Portal-to-Portal Time

Time spent in traveling to and from the working face is time worked. Time spent in checking in and out and returning tools is not time worked.

The rule is based on the hazards and inconveniences involved in reaching the working face, uninsulated wires to be avoided, heavy equipment to be borne, as well as the subjection to company rules and control. (Tennessee Coal & Iron & Railroad Company vs. Muscoda Local No. 123.)

Waiver Sustained; Rejected

Federal District Court ruled that acceptance by an employee of amounts due him constituted a complete discharge of the employer's obligation, and rejected the employee's claim to liquidated damages. (Ortiz vs. Compania Cervecera de Puerto Rico.)

In another case the employer, having made restitution under a consent decree, was held for liquidated damages, since the employee claiming the wage was not a party to the consent decree. (Slavin vs. Grachtenberg.)

Injunction Denied

The Circuit Court of Appeals agreed that injunction was properly denied where the employer had ceased violation of the Wage-Hour Law. In upholding this ruling, the appellate court pointed out that in cases where an injunction was granted despite the cessation of unlawful activities, it was granted because there was a real possibility that the Act would again be violated, or there was a general dispute as to the constitutionality of the law or of the validity of the administrative regulation issued under the authority

(*Continued on page 221*)

Supervisory Problems—No. 3

WHAT WOULD YOU DO IN A CASE LIKE THIS?

Third in a series of articles on methods used at Carnegie-Illinois Steel Corporation, Pittsburgh, to stimulate discussion in foreman training classes. Developed by R. J. Greenly and E. B. Mapel, Industrial Relations Division

Bill has been employed by the company for 20 years and is regarded as one of the best men in his department. Bill has a younger brother, Tom, who has a bad reputation in the community because of a series of irresponsible acts. Tom is generally regarded as being unreliable and dishonest.

One day Bill approached his foreman with a request that Tom be given a job in his department. He stated that, with proper guidance and steady work, Tom would prove to be a good employee, since he was strong, energetic, and had some experience. Furthermore, since this was the first big favor he has asked in 20 years, Bill believed that special consideration was due him.

The foreman did not want to hire Tom even though there were suitable jobs open and men were being employed. However, in order to avoid offending Bill, he stated that all hiring had to be done by the personnel office and that Bill should take Tom in to see the director of personnel. The foreman promised to call the director of personnel to "see what he could do" in Tom's favor. Bill regarded this statement as a promise that Tom would be employed and his plans were made accordingly. The foreman called "off the record" and suggested to the director of personnel that Tom would not be a satisfactory employee and should not be employed.

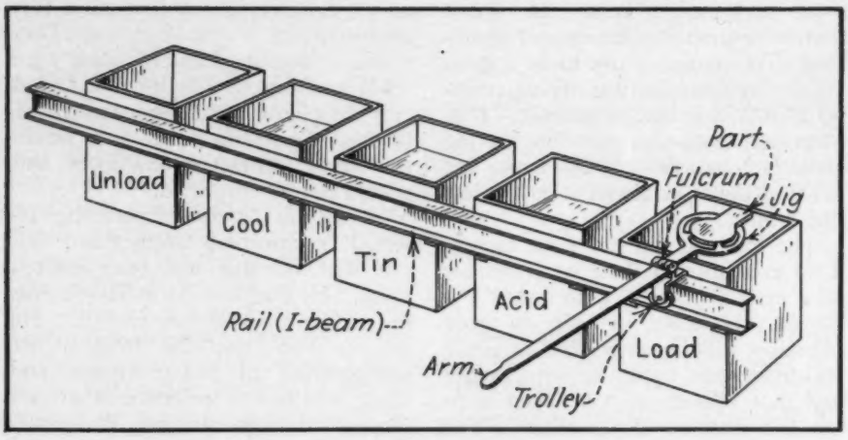
When the director of personnel rejected his brother's application, Bill felt that he had not been treated fairly. He had lost status in the eyes of his family and his friends. He became very resentful towards the management of the company and made an effort to influence other employees through critical comments about the company.

The following statements apply to this situation. Study each one carefully. If you agree, put a circle, around the "T" following the statement. If you do NOT agree, circle the "F". If you are in doubt, circle the "??".

1.	Tom should have been hired because of his brother's good record and long service.	T	?	?	F
2.	Bill should have been told frankly that his brother's reputation indicated that he was unreliable and that the company could not afford to take a chance in employing him.	T	?	?	F
3.	The foreman should have offered to interview Tom to determine his qualifications for the job.	T	?	?	F
4.	The foreman should have explained to Bill, before referring him to the personnel office, that Tom's chances for employment were slight.	T	?	?	F
5.	Bill should be verbally reprimanded for criticizing the company.	T	?	?	F
6.	Bill was right in believing that he had not been treated honestly and fairly.	T	?	?	F
7.	Since the foreman must deal directly with the employees, it is a good policy to maintain his good relations at all costs, regardless of any ill effect upon the attitude of employees towards the personnel department.	T	?	?	F
8.	It is essential that the foreman be allowed to "pass the buck" to a staff organization which is not in direct contact with the employee.	T	?	?	F
9.	The company will usually gain by employing the relatives of present satisfactory employees.	T	?	?	F
10.	The foreman should have clarified in Bill's mind the fact that the offer to consider Tom should not be construed as an offer of employment.	T	?	?	F
11.	In order to maintain the highest morale, it is necessary that the foreman assume responsibility for the action of staff organizations.	T	?	?	F
12.	This foreman should be disciplined for "neglect of duty" because he failed to assume the responsibility of refusing Bill's request.	T	?	?	F
13.	Since the foreman is no longer permitted to hire his own men, there is no reason why he should be responsible for company policy in regard to the selection of new employees.	T	?	?	F
14.	Sometimes it is desirable to grant an employee a request which is unreasonable to avoid possible ill will.	T	?	?	F
15.	It is not the function of a foreman to decide whether a man is suitable for employment, and all such problems should be referred to the personnel office, even when the solution is quite obvious.	T	?	?	F
16.	Long service does not give a man the right to request an unusual favor in regard to the employment of others.	T	?	?	F

MANAGEMENT SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary management accomplishments. Accepted articles will be paid for



One Man and Fulcrum Do Work of Two Men

WAYNE J. WHEELER, Flint, Mich.

One way of getting around the use of two men in heavy operations is to apply leverage to the object to be lifted.

It was necessary to tin the bottom of a part weighing about 100 pounds. Rather than put two men at work to lift the part in a jig, dip it in acid, in the tin pot, and then in the cooling chamber, a 4-ft. arm with fulcrum about one foot from the end was set up. Trolleys at the fulcrum run along an I-beam in front of the various stations.

With one man handling the job, there is a labor saving of 50 percent, less effort is expended, the operation is much safer.

In the original "war on waste" drive at The Miller Company, Meriden, Conn., the three dictators lost their heads as soon as scrap quotas were reached—which occurred two months ahead of schedule. For the new campaign the quota board shows the dictators with severed heads under a pile of scrap. As the scrap pile builds up, it pushes the dictators farther and farther into the ground—to where the devil with his fire and pitchfork awaits them

These Methods Save Steel and Copper Scrap

SOURCE—General Electric Company

The production of busbars from ¼-in. copper bar stock entailed a large number of drop-offs or unused ends, often of fair size. The procedure had been to accumulate the scrap for use of the foundry in making copper and copper-alloy castings.

A more efficient utilization of this scrap was found in (1) saving all pieces having an area of 4 square inches or more, (2) separating the odd-sized pieces for the manufacture of washers and spacers, and (3) retaining the more regular sizes for manufacture of larger parts.

With this scheme, about 90 percent of the orders for parts made of ¼-in. copper, and less than 8 inches long, are being filled from scrap. An annual saving of 125,000 pounds of new bar copper stock is thus estimated.

Scrap steel is utilized in much the same way. A large tonnage of carbon panel steel scrap is produced each year in primary shearing operations on switchgear panels. Formerly this scrap was sold to dealers, with a certain percent utilized in making other steel parts.

Now this scrap is accumulated and sorted, and pieces with an area of 50 square inches or more are saved. The scrap is then divided into two assortments of long and short pieces for manufacture of various small parts.

During a recent 6-week period, 40,000 pounds of sorted scrap were used, and it is estimated that 800,000 pounds of material will be saved annually. With a finer sorting of the scrap, it is expected that 1,000,000 pounds can be reclaimed for further manufacture of small parts.

•

Work Simplification Equipment Cart

Work simplification training in peacetime usually consisted of several meetings a week at North American Aviation, Inc. Now, seven conferences are operating continuously for the supervisory group and two for new employees.

The magnitude of the training program made it necessary to schedule work simplification conferences for one of several conference rooms alternately. The conference leaders, in order to have all necessary

(*Continued on page 232*)

MAINTENANCE SERVICES

The well-maintained plant is the high-production plant

SELECTION • INSTALLATION • INSPECTION • UPKEEP • ORGANIZATION

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CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York, N. Y.

Director of Circulation:
Change my address on Factory Management and Maintenance

From .....

.....

To .....

.....

Signed .....

MAINTENANCE as the Editors See It

There's No Substitute for Competent Supervision

THE MAINTENANCE ELECTRICIAN who replaced a defective flexible shunt on a starter with a piece of plain, solid wire may have thought he was exercising commendable ingenuity in an emergency. In reality all he did was keep the starter in service for a little while by inviting the serious trouble that soon developed.

In another instance, too-frequent operation of thermal overload devices was stopped by the simple, and dangerous, expedient of practically destroying these devices, to make them inoperative.

Another example of asking for trouble, and getting it in good measure, came to light when a starter was wrecked by a flashover. In a hurry to get through, someone took a chance on a defective arc shield—and lost.

Perhaps these things could not have happened in your plant. Nevertheless they all came to light recently in industrial plants.

It is very difficult, if not impossible, to avoid all trouble with equipment. Some failures and mishaps are practically certain to occur. Chances are, however, that unavoidable troubles are a rather small proportion of those that actually occur.

Inexperience doubtless is responsible for some preventable troubles, but carelessness, too much haste, over-willingness to take a chance account for many more. Too much work, too little time for doing it, the urgent need to get production started again, all conspire to make expedients attractive. Haywire schemes often can be excused, if not justified, by emergency conditions, but unless they are sound in principle and used with plenty of common sense they may in the long run aggravate rather than alleviate trouble.

Competent supervision will help your men to distinguish between sound and ingenious expedients and hazardous makeshifts. It is also an effective preventive of carelessness and too much haste.

Cost Figures Don't Always Tell the Whole Story

APPLICATION OF PRINCIPLES learned in conducting his own business has enabled one plant engineer to make sizable savings in maintenance costs.

This man had conducted for many years a small business enterprise far removed from manufacturing or plant engineering. When the war broke out he accepted an old friend's invitation to take charge of maintenance in his plant.

Study of maintenance costs for preceding years gave him little real information. There were a number of cost classifications that were no doubt satisfactory for the accounting department, but lump-sum figures told almost nothing that would help to reduce costs.

Months were required to run down the items that comprised the total, but it was time well spent. For example, a large sum for floor repairs was traced to a few places where conditions are unusually severe. Installation of iron floor plates at these spots cut repair costs two-thirds.

A few wire screens and Be Careful signs cut window replacement costs away down.

A large yearly sum for repairing doorways used by trucks was reduced to almost nothing by installing suitable guards.

Motor repair costs were found to be concentrated in a few places where conditions clearly indicated the use of inclosed motors.

The net result of clearing up these and other situations was a decided cut in maintenance costs and sufficient reduction in work to ease noticeably the burden on the maintenance force.

Successful conduct of the maintenance department requires the application of good business methods and principles quite as much as sound engineering.

Dogs Are Helping Plant Guards

USE OF DOGS for night patrol duty is a new wrinkle in plant protection, introduced in at least two important war plants. Since a dog's senses of smell and hearing are much sharper than man's, the use of these four-footed guardians seems to offer worth-while possibilities, under suitable conditions.

Helping to guard a plant is not a task that can be entrusted to any friendly little Fido. The dogs now in service are tough, savage fellows who will attack with a ferocity that bodes ill for even the huskiest intruder.

Detection of prowlers is, however, the most important function of these dogs. Hence they are trained to discover the presence of persons who cannot be seen by the guard. If the person can identify himself satisfactorily when challenged by the guard, nothing happens. Otherwise the dog is ordered to attack.

Dogs who make friends with everyone would obviously be of little use. Accordingly they are taught to respect and obey only their keepers. No one else comes in contact with them. Since the dogs cannot be trained to recognize everyone who may have to be on the plant grounds at night, they are kept on a leash and released only when ordered to attack.

Idle for 10 years, this 50-year-old plant is now turning out many barrage balloons and rubber boats

Revamping an Old Plant for a War Job

G. A. VAN BRUNT, Associate Editor, *Factory*

THIS IS THE STORY of how a 50-year-old, inactive plant of United States Rubber Company was thoroughly revamped and modernized so that today it is a 100 percent war plant, turning out large numbers of barrage balloons and inflatable boats.

To prepare this plant in Woonsocket, R. I., for its important war job, two floors had to be removed in one end of a large building to give a space three stories high. Modern new lighting, heating and ventilating systems, and sanitary facilities had to be installed. Extensive repairs had to be made to roof and floors.

The 50-year-old plant consists of a main building having two wings, and two smaller buildings. The main building is four stories high. One of the small buildings serves as the power house, while the other is used for storage. All these buildings are of brick, with wooden joists. Floor space is in excess of 200,000 square feet.

For many years this plant was used for the manufacture of rubber boots and shoes. In the early 1930's, manufacture of these products was moved elsewhere. For almost ten years the plant was idle, save for 25,000 square feet of floor space rented by several small concerns.

Early last year orders were received for barrage balloons and rubber lifeboats, and it was decided to make them in this plant.

A careful examination showed that ten years of neglect had taken a heavy

Fluorescent lighting provides an average of 35 foot-candles throughout the plant, and up-to-date ventilating systems add to workers' comfort. Old maple floors were repaired where practicable, or relaid, and covered with canvas to protect the workers against splinters, balloons against tears

toll. For example, the roof leaked badly in countless places. In a few areas the wooden roof deck and supporting structure had decayed and collapsed. Hundreds of window lights were broken. Water had warped and checked some of the maple flooring.

One of the first steps in reconditioning the plant was to make it weather-tight by repairing the roof and replacing broken lights. Repairs to the roof were started with an inspection of the deck and supporting structure. All defective parts were replaced.

In some places the old built-up covering could be restored to good condition by treatment with a waterproofing compound. For the most part, however, it was necessary to tear off all the old felt and lay a new four-ply covering mopped on with asphalt and covered with gravel.

Wood sash and doors had been used throughout. They were examined for condition, replaced if in too poor shape to warrant repairing.

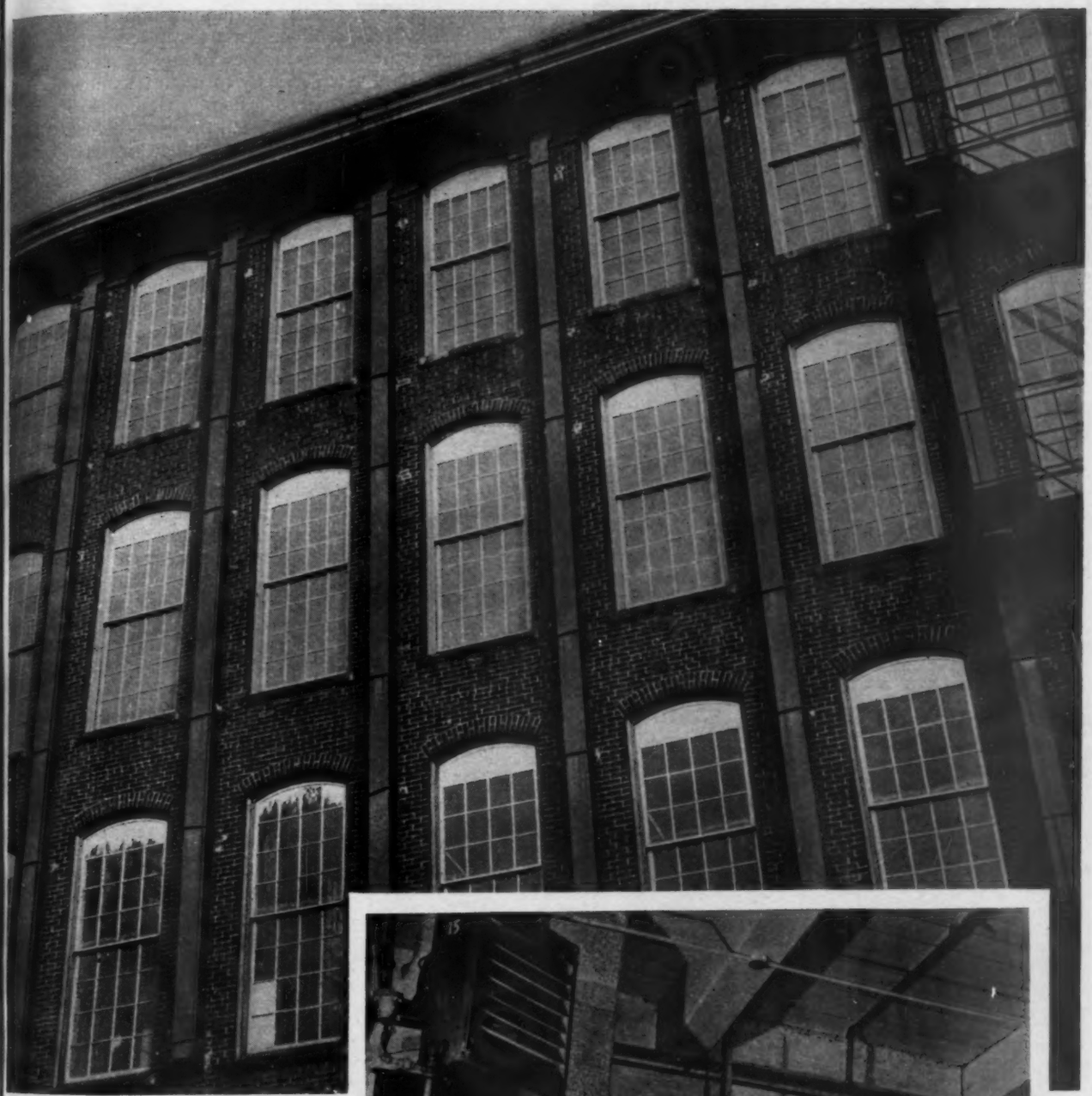
Floors Repaired

Maple flooring had been used in most of the working areas, and much of it was in good condition. In spots where the strips were badly worn or otherwise defective, they were replaced. In addition, a new floor was laid throughout the third floor, because the old flooring was so bad that if canvas had been laid, the cracks and worn spots would have been felt through and resulted in a poor surface to do floor work on.

Balloons and rubber lifeboats are made of large pieces of treated fabric cemented together. The bulk of this work must be done on the floor. In order to protect the workers from splinters and prevent the balloon fabrics from being torn and soiled, the floors in the assembly areas are covered with canvas nailed down along the edges. A concrete floor was laid in the churn and the spreader rooms.

One of the important problems encountered in adapting the old plant to new uses was how to provide space for testing and inspecting balloons.

Barrage balloons are about 65 feet long and 28 feet in diameter when inflated. On final inspection they are



At one end of the plant, the third and fourth floors were taken out to give space for testing balloons. Wall then had to be braced with 10-in. H-columns 28 feet long

Unit heaters, special ventilators, white paint, all help to provide good working conditions

blown up to full size. In this old plant, with its 15-ft. ceilings, there was no space suitable for that purpose.

It was eventually decided to take out the third and fourth floors in an area 100 feet long at one end of the main building. This area is separated from the remainder of the plant by a firewall. Since removing the joists

from these two floors would leave the outside wall without lateral support, it was braced with 10-in. H-columns 28 feet long. These braces are spaced on 8-ft. centers along the wall on the outside and bolted to it.

Bracing was not considered necessary for the end or for the other side, which is formed by an interior wall.

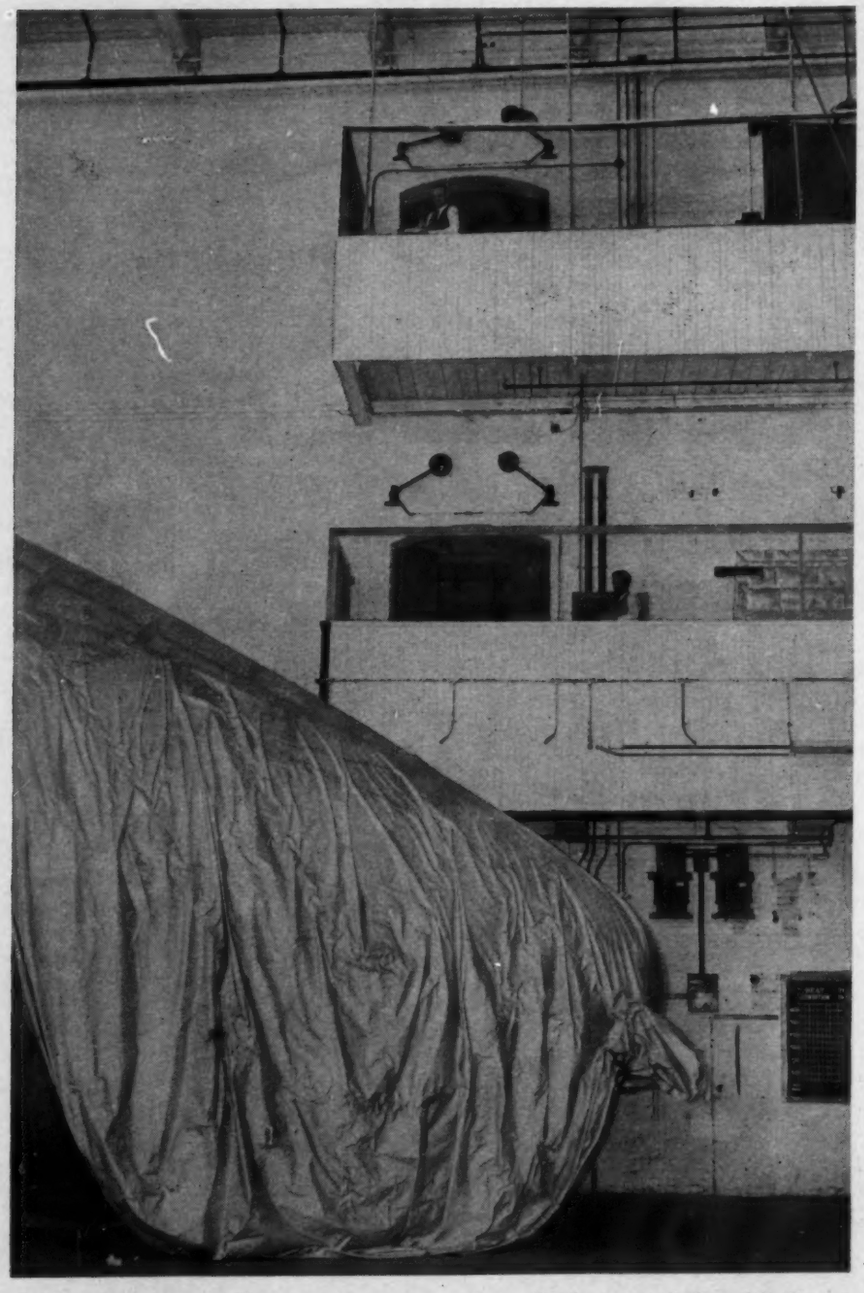
Two balconies were built along the interior wall at the third and fourth floor levels, for the inspectors and for egress into a wing.

Most of the old wiring had been put in years ago and was run open. Although a good deal of it probably was still usable, it was decided in the interest of safety and continuity of operation to tear it all out and rewire the plant. All the new wire is in conduit. Circuits were laid out to fit present needs most economically.

The old lighting system was, of course, outmoded. It was replaced everywhere, except in the power house and the mechanical department, which are now being changed over, with a fluorescent lighting system consisting of two 40-watt bulbs per fixture. For the most part fixtures are mounted 10 feet high and spaced on 8-ft. centers. The average intensity of illumination is 35 foot-candles. In a few places interference with manufacturing operations made it necessary to mount fixtures 13 feet from the floor. Here the illumination is about 32 foot-candles. This relighting job called for 1679 two-bulb fluorescent fixtures.

The plant was formerly heated by pipe coil radiators. Almost all these old radiators were scrapped. In a number of departments they were replaced with unit heaters, of which a total of 28 were installed. Location and other factors made it advisable to use manual control for some heaters; the others are controlled by thermostats.

In the remaining departments it was necessary to install a combination heating and ventilating system. In these departments solvents are used whose fumes are inflammable and slightly troublesome. Therefore, the air is changed an average of ten times an hour, oftener in some areas. Air is heated by passing it over steam coils in a large chamber; it is then discharged from an overhead duct through openings in the sides. Large air outlets along the sides of the rooms draw off the air and discharge it outside. Both inlet and outlet ducts are provided with fans.



In the barrage balloon testing room, for which two of the old floors were removed, balconies provide lookouts for inspectors

Good Ventilation

The first installations that were made consisted of a single-duct system covering an entire department with one inlet and one exhaust. Experience showed that the areas were too large for the successful operation of such a system. Later installations have consisted of several smaller duct systems for each department. Each system has a heating chamber, draft fans, and exhaust ducts and fans.

Bringing sanitary facilities up to modern standards was a good-sized job which could best be handled by tearing out much of the old installations and putting in new equipment. This is an undertaking that has just recently been completed, largely due to the necessity of providing additional facilities as new workers were hired.

The final step in the building reconditioning program was to give all walls and ceilings a good coat of flat mill white paint. A gray dado helps to improve the appearance of the departments and render finger marks and other smudges less visible.

One room recently completed was painted with a different color scheme. The ceiling was given a coat of flat mill white paint, the walls a pastel green flat paint with a darker glossy green dado, and the floor a steel gray.

If Fire or Flood Damages Electrical Equipment

W. W. McCULLOUGH, Service Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh

How TO GET damaged electrical equipment back into service as quickly as possible is a question that frequently comes up. In any plant such equipment may suddenly be put out of commission by a flood, or it may become water-soaked, perhaps damaged in other ways, as the result of a fire, or by the rupturing of a tank or pipe. Hence damaged electrical equipment can be divided into two classifications:

1. The apparatus involved remains dry, damage resulting from falling material.

2. The damaged apparatus is wet.

Blow out revolving apparatus such as motors and generators, in the first or dry classification, with compressed air at a maximum pressure of 50 pounds. Clear the air line of accumulated water before directing the blast against insulation. Too much air pressure may loosen binding tape and blow dirt under it. Remember, the use of compressed air simply transfers dirt from one location to another. Collection of dust by vacuum may be justified under bad conditions.

Drain and clean sleeve bearings with solvent before filling with new oil. Inspect all felt seals before reassembly of the equipment, and replace any that may have been damaged.

If there is any question about entry of dirt through ball-bearing seals, clean the bearings in solvent and use new grease. Ball bearings are precision made and require careful handling. Provide separate, clean working quarters for handling antifriction bearings. Keep grease containers covered.

Modern transformers are pretty thoroughly sealed against breathing, hence there is little likelihood of internal damage from falling material and dust, unless the tanks are crushed.

Inspection will determine whether bushings, leads, oil gages, drain valves, and gadgets projecting from the case require repair or replacement. Check the oil level to make sure no oil has been lost through breakage of fittings.

Wet apparatus, especially that damaged by flood, requires more elaborate reconditioning because the insulation is affected. Motors and generators have an electrical circuit separated from the magnetic system and the mechanical assembly by a relatively

It is not only the water that puts equipment out of commission when a flood comes—dirt and mud also seep in. Getting machines back into running order involves expert handling, drying, and testing

thin layer of insulation. Compared with copper and iron, which make up the major portion of the machine, this insulating film is not only very fragile, but much more sensitive to moisture. Regardless of the mechanical condition, insulation values must be restored before electrical apparatus can be put back into service with safety.

In general, the first step is to disassemble the apparatus and thoroughly wash all parts with water. Use an approved liquid, such as a water-white petroleum distillate free from suspended matter, produced by the major oil companies, to remove grease from insulation. Suitable trisodium phosphate compounds may be used in cleaning metal parts. If water is applied to insulated parts with a hose, do not let the pressure exceed 25 pounds per square inch.

Clean With Steam

When apparatus is covered with chemicals, grease, or filth, a steam cleaning outfit will be found useful. It is a device for heating flowing water and ejecting it through a nozzle under pressure. An attachment is provided for injecting a liquid solvent into the flowing water. The proportion of solvent to water depends upon the amount of grease and oil to be removed. Do not let the temperature of the water or mixture applied to the insulation exceed 90 degrees Centigrade (194 degrees Fahrenheit). Higher temperatures may be used in cleaning bearings and other metal parts. Remove surface moisture with a clean cloth. Do not use waste.

Clean bearings thoroughly and remove rust from journals. Inspect the cleaned apparatus carefully and correct any evident defects.

A temporary drying oven may be made of bricks, concrete blocks, or panels of heat-insulating material secured to wood frames. Sheet metal, wood lined with asbestos, or even all-wood boxes have been used for emergency drying of electrical apparatus. Ovens must be ventilated to provide circulation and remove moisture. Also, provide some form of temperature-indicating device. Electric or steam heat is safest.

Pre-heated air may be forced through the oven. Many types of heaters may be used if arrangements are made to eliminate fire risk and keep products of combustion out of the oven.

Have fire extinguishers on the job when electrical apparatus is being cleaned or dried. When mixed with air, oil vapors and gases driven out of solvents and varnishes may be flammable or explosive. Some of these gases are extremely irritating to the eyes, throat, and nose.

Not air raid wardens practicing on a bomb, but members of a salvage crew cleaning motors with a hose—the first step in reconditioning

Use an insulation resistance meter for determining the condition of the insulation. A 500- or 1000-volt instrument is particularly suitable. Do not use a 2000-volt meter for testing low-voltage apparatus. A voltmeter for measuring the drop across individual field coils will be required if direct-current apparatus is involved.

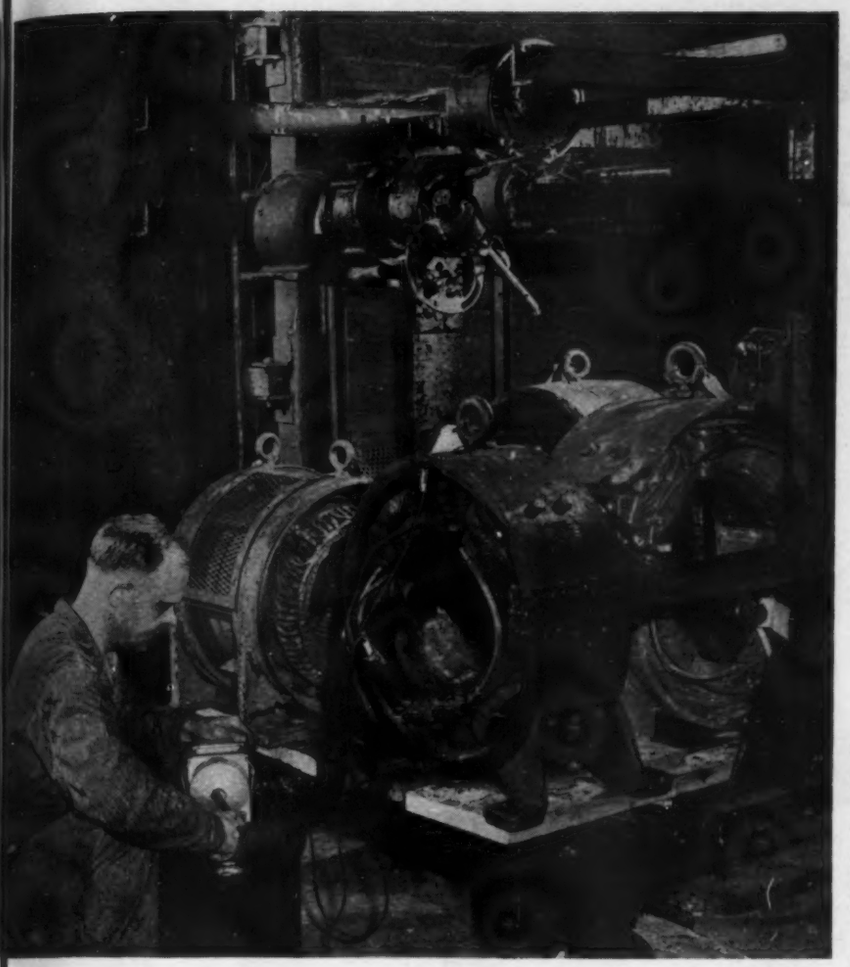
Heating in an oven for 20 to 25 hours at 115 degrees Centigrade is usually sufficient for drying the windings of 120-, 240-, and 480-volt squirrel-cage and wound-rotor induction motors. Collectors may require special drying or, in some instances, complete reinsulation.

Separate the apparatus in the oven so that air can be circulated around it. When an insulation resistance of 1 megohm is obtained, apply a coat of good air-drying varnish to the windings. Paint between collector rings with one of the accepted red enamels.

In an extreme emergency it may be necessary to place low-voltage squirrel-cage induction motors in service as soon as surface moisture has been removed, but never do so until the bearings have been thoroughly cleaned. Preliminary operation for a few hours without load is desirable. Many such motors with mechanically sound insulation will dry out in service, although the life of the insulation may be shortened and some insulation may fail.

Dry a.c. generators, synchronous motors, and high-voltage induction motors in an oven until an insulation resistance of 1 megohm per 1000 operating volts, with a minimum of 1 megohm, is obtained. Collectors may require special drying or reinsulation if there is serious distortion, and it may be necessary to remove field coils for individual drying or to replace insulation washers.

A drying temperature of 115 degrees Centigrade may be used for armature windings. Do not let the drying temperature for gum-impregnated field coils exceed 105 degrees Centigrade. Usually 20 to 24 hours



An insulation resistance test will tell whether the windings of flooded motors have been sufficiently dried out and are fit for service

drying will be required to obtain an insulation resistance of 1 megohm. Voltage drop tests across field coils are desirable.

Direct-current armature and field windings may be dried in an oven as described for a.c. motors. Commutators are sometimes difficult to dry, particularly if they were warm and expanded when submerged, because chilling creates enough suction to fill the commutator with water. It may be advisable to remove a clamp bolt, or even loosen the front V-ring, to drain out trapped water. When vacuum equipment is available apply a preheat temperature of 115 degrees Centigrade for two hours; then apply a 27- to 28-in. vacuum for seven hours at the same temperature.

When commutators are dried at atmospheric pressure, several days may be required to obtain an insulation resistance of 1 megohm, and even then the insulation between bars may not be thoroughly dry.

Dismantle brush rigging for thorough cleaning, and dry all insulation before assembly.

Although most transformers are protected by gaskets or more elaborate sealing devices, they may be vulnerable to water.

Make a careful inspection to determine whether the transformer is actually wet. Water in the bottom of the tank is not in itself proof that the transformer is unsafe for operation. Some moisture uniformly held by the insulation may have accumulated during normal operation and is not likely to cause trouble. On the other hand, water on the terminal board may result in a breakdown.

If the oil level has been disturbed very little or not at all, check the oil for dryness. Good oil will test 22 kilovolts in a portable oil tester.

When a transformer is thoroughly wet, the core and coils may be covered with a coating of mud and slime. Remove this coating by washing with transformer oil. Clean the entire core assembly thoroughly.

No definite rules can be laid down for the amount of drying required. Distribution transformers of the lower-voltage classes usually can be dried in an oven overnight. Experience shows that dry-type instrument transformers may require several days to dry because it is difficult for trapped water to boil off through the outer layers of tape and insulation.

Large, high-voltage transformers may require weeks to dry. Handle them only under the supervision of experienced engineers. Consult the service department of the transformer manufacturer.

The megohm resistance of the insulation to ground should be from ½ to 1 megohm per kilovolt, when satisfactorily dried. Ordinarily the higher figure would be used, but in an emergency where time is vital, the lower limit may be specified, particularly for small, low-voltage distribution transformers. Always take the megohm reading hot. When the resistance is measured cold a high and misleading figure can be obtained.

Check the Reading

Remember that the megohm resistance is a function not only of the dryness of the insulation but also of the size of the transformer. A reasonable value of megohm resistance for a given transformer can be arrived at by measuring a duplicate unit known to be dry.

Auto-transformers can usually be dried satisfactorily in an oven in about the same length of time as low-voltage distribution transformers.

Instrument transformers are more difficult to dry out, as mentioned previously, because the outer insulation is usually less porous. In some instances it may be necessary to strip off these outside layers of tape.

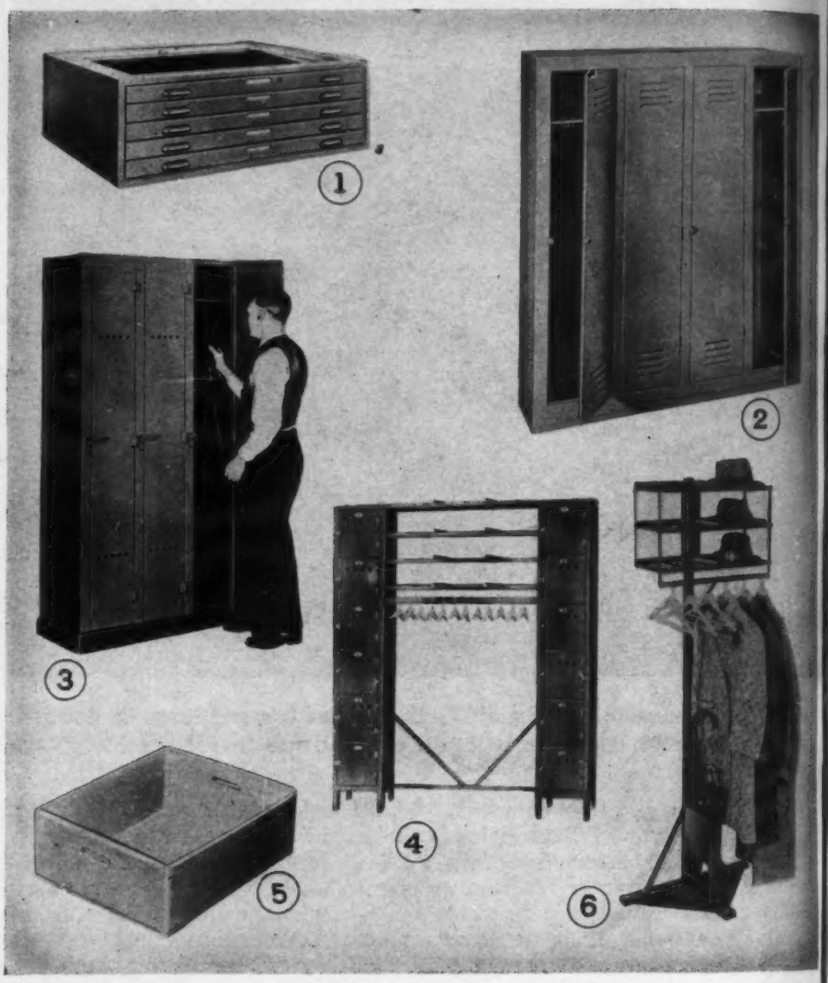
It is difficult to give specific instructions for drying out switchgear and control apparatus because of the wide range of units and instruments included.

Usually it is advisable to return instruments, meters, relays, voltage regulators, and electronic devices to the manufacturer for repair and test. A great deal of control apparatus, however, can be dried out on the job and put back into service. Dismantle the equipment, remove the operating and relay coils, and dry them in an oven. Insulating washers and spacers also can usually be dried in an oven. Clean the mechanical assemblies carefully before installing the coils.

Small circuit breakers can be handled on the job. But it is recommended that experienced switchgear engineers be placed in charge of salvage operations wherever large, high-voltage breakers with auxiliary apparatus are involved.

Wood and Fiber Furniture and Equipment

Wood and fiber equipment introduced to you by *Factory* during the past 12 months is reviewed here to give you a quick one-year summary



FILING CABINETS of wood, in two types—with roller bearing cradle suspension, and non-suspension with four rollers to each drawer. Four-drawer style, letter and legal widths. All-Steel-Equip Company, Aurora, Ill.

FILING UNITS of wood that interlock and stack with present steel equipment. Designed especially for blueprints. Hamilton Manufacturing Company, Two Rivers, Mich. (Figure 1)

LOCKERS and CABINETS have hardwood tops, bottoms, and frames; sides, backs, and doors, are pressed wood. "Shoprobes" provide full-length coat-hanging space and locked compartment for each employee. Lyon Metal Products Company, Aurora, Ill.

LOCKERS in standard and special sizes of folding-hinged design. Panel is plywood, moisture resistant treated. Door frame is 1-in. poplar, doors, ¾-in. plywood, with slotted louvers. Optional locking devices. Lockercraft Company, Canton, Ohio. (Figure 2)

LOCKERS made of fiberboard offer protection from moisture and dirt. Olive-green lacquer finish gives easy-to-clean surfaces. Rabbeted connections, reinforced with angle braces, add rigidity and strength. Sanymetal Products Company, Cleveland. (Figure 3)

LOCKER RACKS, of hardwood and plywood, provide 12 employees with coat hangers, spaced far enough apart to permit wet wraps to dry, individual hat shelves, and 12x12x12-in. lock boxes. Vogel-Peterson Company, Chicago. (Figure 4)

PARKING RACKS for 18 bicycles. All-wood racks are 36 inches in width, length, and height. Sturdily constructed. Greene Manufacturing Company, Greene, N. Y.

SHELVING, quickly adjustable, in open and closed types. Sections are 36 inches wide, 84 and 96 inches high, and may be 12, 18, or 24 inches deep. Top, base, shelves, braces of solid hardwood. Side and back panels of ¼-in. plywood. Lyon Metal Products Company, Aurora, Ill.

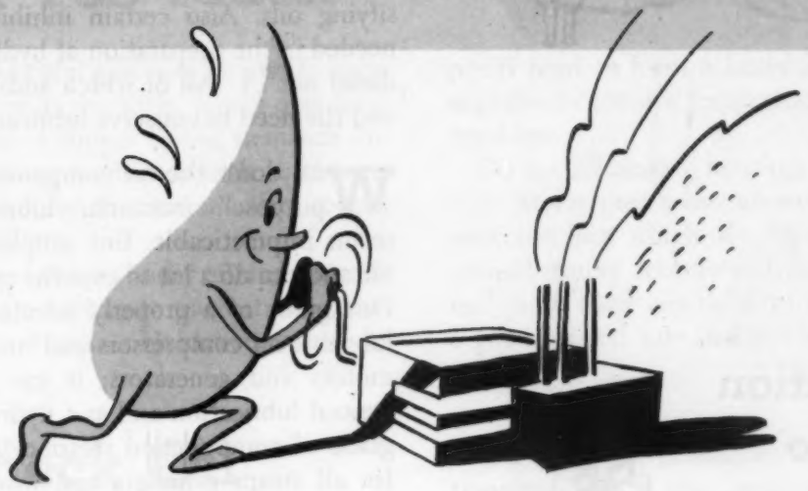
SHOPBOX of heavy, solid fiberboard has nesting feature which permits stacking the boxes in tiers to conserve floor and bench space. Sturdy but light in weight. Container Corporation of America, Chicago. (Figure 5)

STORAGE CABINETS made of wood have four adjustable, removable shelves. Painted olive drab inside and out. In 18- and 24-in. depths, 36 inches wide, and 72 inches high. W. C. Heller & Company, Montpelier, Ohio.

TELEPHONE BOOTH has walls and ceilings of perforated, reinforced plywood panels filled with sound-absorbent material. Known as Model 207 Acoustic-Booth. Shelf for telephone and note-taking, overhead light fixture with pull chain are provided. Burgess Battery Company, Chicago.

WARDROBES, all wood, so nearly like steel racks that they can be used as add-on units. Accommodate three or six persons per running foot. Provide for hats, coats, umbrellas, and overshoes. Vogel-Peterson Company, Chicago. (Figure 6)

How to Get the Most Out of LUBRICANTS



Industry is finding it necessary to get along with smaller quantities and fewer kinds of lubricants. To get the most from them, plants will:

1. **Use enough lubricant, never too much**
2. **Check oil temperatures**
3. **Guard against contamination**
4. **Apply lubricants correctly**
5. **Schedule lubrication**
6. **Check condition of lubricant**
7. **Keep systems clean**
8. **Recover used oils by purification**

These eight approaches to the conservation of industrial lubricants are discussed in the pages that follow

Text by Dr. E. R. LEDERER, Consulting Engineer, Sun Oil Company, Philadelphia

FACTORY MANAGEMENT AND MAINTENANCE, MAY, 1943

Conserve as Never Before

WHAT about the "inexhaustible" supply of petroleum products we have always taken for granted? Just this: We still have enormous potential reserves of crude oil – one-half of the world's reserves. But we lack the materials and equipment to bring it to the surface, refine it, ship the refined products to points where they are most needed ... Animal and vegetable fats and oils used in greases and compounded oils are on the restricted list. So are sulphonic and naphthenic acids used for emulsifying oils. Also certain inhibitors and additives needed in the preparation of hydraulic, turbine, and diesel oils . . . All of which adds up to rationing – and the need to conserve lubricants as never before.

What Simplification Can Do

WHY don't the oil companies produce an "all-purpose" *industrial* lubricant? Because it seems impracticable. But simplification *is* practicable and can do a lot to ease the present situation ... One grade of a properly selected oil will serve to lubricate air compressors and ring-oiled bearings on motors and generators; it can also be used for general lubrication and as a hydraulic fluid . . . One grade of compounded steam-cylinder oil will serve for all steam cylinders and worm gears . . . One grade of grease can be used for all types of anti-friction bearings on machines, electric motors, and generators. The same grease may also be used for cup or gun grease through the entire plant.

A Guide to Purchasing

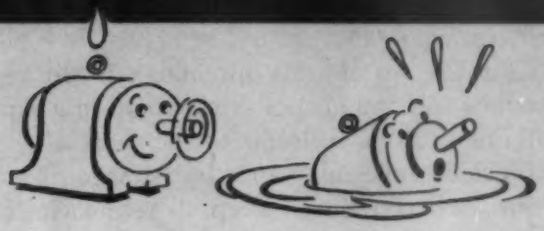
WHICH lubricants to buy? Quality and service are prime considerations. And recommendations prepared through the cooperative efforts of machine manufacturers and refiners are dependable guides to the selection of lubricants that will extend the life of equipment and tools – and increase production . . . High-quality lubricants result from continuous efforts by scientifically trained chemists, technologists, and field engineers. They all cooperate to develop the best formulas for the most efficient lubricants . . . They supervise every step in the process, test the lubricants in engine laboratories before they are permitted to go on the market, and watch how they behave under actual operating conditions.

The Steel Drum Situation

ARE steel drums scarce? Yes. For that matter they are irreplaceable. If oil in drums is to be delivered promptly and in the quantity needed, then the industrial user must do everything in his power to conserve drums and lengthen their life ... So – empty the drums promptly, handle carefully, guard against needless exposure to weather and rusting, and return them to the supplier with the greatest possible dispatch.

How to Get the Most Out of Lubricants

Use Enough, Never Too Much



Too much oil is wasteful and may be just as harmful to the equipment as too little. Avoid over-lubrication. Fit the rate of supply to the demands created by new operating conditions such as changes in speed or temperature fluctuations that require more cooling.

An excess of compressor cylinder oil, for instance, beyond the amount necessary to prevent wear, may cause carbonization of valves. Hardened carbon deposits tend to form a heavy insulating coat which may cause excessive temperatures, valve leakage, and breakage.

Do not fill bearing housings to overflowing; it not only wastes grease but also causes leaky seals and generates heat which may harm the bearings. Most manufacturers recommend that bearings be filled not more than one-third to one-half full. This is a good general rule to keep in mind.

Check Oil Temperatures

Compliance with manufacturers' recommendations of safe operating temperatures prolongs the service life of equipment, tools, and lubricants.

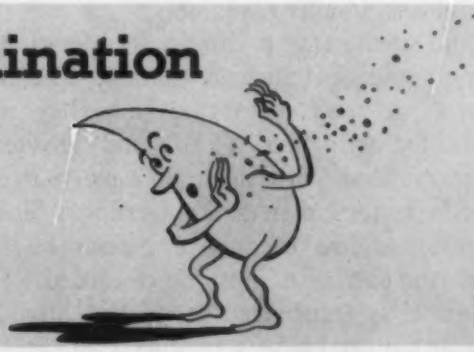
Check temperatures in oil reservoirs occasionally. If found excessive, provide coolers to keep the oil at a normal temperature. Also, install oil coolers where severe operating conditions cause abnormally high temperatures, as may occur in hydraulic systems, bearings, metal-working operations, etc.

Abnormally high temperatures cause a decrease of the oil viscosity, increased slippage, excessive leakage and evaporation, loss of efficiency, waste of oil, and even damage to the equipment.

If the equipment is exposed to cold weather or low room temperatures, apply means for preheating the oil, such as steam coils submerged in oil reservoirs, before starting the machines. At low temperatures, lubricants do not possess the necessary fluidity properly to reach and lubricate the moving parts. Starting may be delayed, production time lost. Shocks to equipment and lines may occur, causing leakage later on and damage to the equipment.

Inspect the piping in oil coolers or heaters frequently. Keep it tight and free from rust and scale. Otherwise, heat transfer will be reduced, and the oil may be contaminated.

Guard Against Contamination

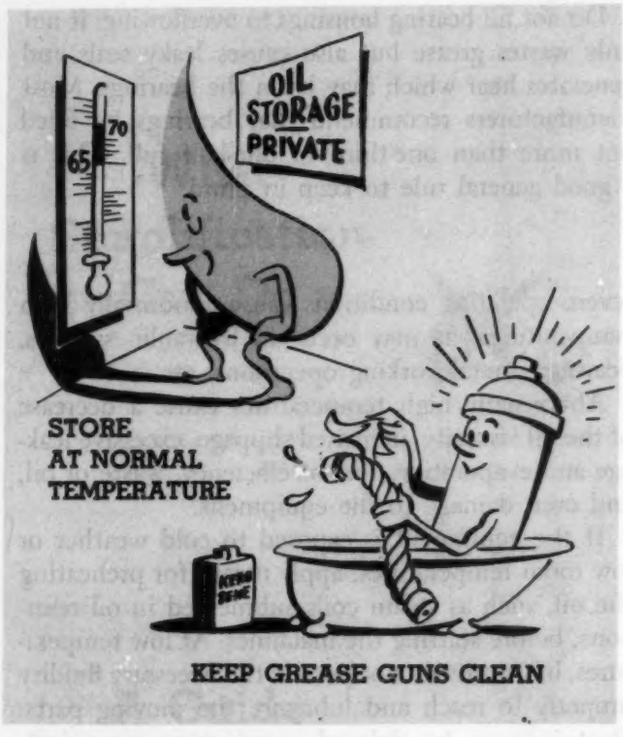


Be sure that oil piping is kept tight to prevent leakage and contamination of lubricating oil or hydraulic fluid by cutting fluids, infiltration of excess air, moisture from the surrounding atmosphere, extraneous dirt, and abrasive dust. They all tend to accelerate deterioration of lubricants. Separate

drainage systems and reservoirs for lubricating oil and hydraulic fluids can be installed at low cost by using scrap material. The resulting saving pays for the installation in a short time and helps to conserve the supply of lubricants, hydraulic oil, and cutting fluids.

Cleanliness is of great importance in storing and handling oils and greases. Store them in a separate building or in an inclosure in the shop.

Provide sufficient room for storage in tanks, drums, and containers. Keep all receptacles clean. Protect them from the elements, dust, etc. Keep the room at normal temperature, 65 to 70 degrees



KEEP GREASE GUNS CLEAN

Fahrenheit. Otherwise certain types of lubricating oils thicken, and greases become hard. Both then become difficult to handle. Never leave drums and containers open and exposed to the atmosphere.

A great deal of waste can be prevented by exercising care when transferring oil or grease from the original barrel into smaller containers.

Use oil and grease pumps for these operations. If dispensing equipment such as funnels, oil cans, and measures are used, take care that they are always fully drained, kept clean, and covered. Grease contaminated with dust, abrasive matter, or lint causes serious damage to bearings. Since foreign substances like the above cannot be removed from the grease, it must be discarded.

When grease is transferred from the original drum to grease pails or buckets, use only clean metal paddles. Do not use dirty paddles or splintered wooden paddles which have become saturated with grease and cannot be wiped clean. Do not use the same grease pail for different grades of grease unless it has been thoroughly cleaned first. Equip pails or buckets with tight-fitting covers. Keep the covers on tight when the pails are carried around, to protect the grease from contamination by abrasive material in the atmosphere.

Keep grease guns and fittings clean. Always wipe the fitting with a clean cloth before the nozzle of the grease gun is attached to it. Do not permit grease to remain encrusted on them. Inspect grease guns after the greasing operation is completed; remove the grease; and clean the gun thoroughly before it is filled with grease again. A mixture of two different greases will not have the characteristics of the grease that has to meet certain lubricating requirements.

Where different grades of grease are used regularly, use a properly marked gun for each, and mark the grease fittings correspondingly. Different colors or metal tags help to avoid confusion in the application of the correct grease.

The safest and most economical method is to transfer oil or grease from the original barrel to smaller pump- or gun-equipped reservoirs on platform trucks which may be moved to the various machines to be lubricated.

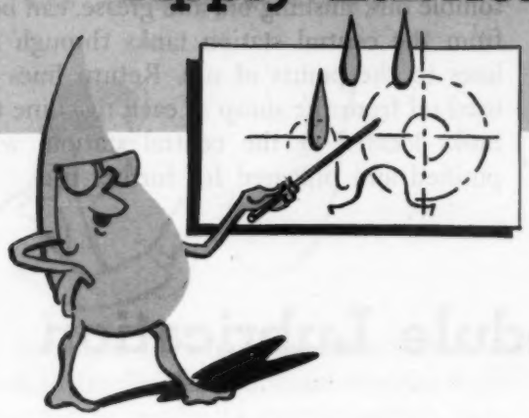
Do not deliver cutting fluids to the tool and work from drip cans. Do not apply them by means of a brush. These methods are wasteful and inefficient. Direct and regulate the flow of fluid by means of a drop-feed oiler, or by one or two pipes which deliver the fluid close to tool and work, so that it will produce the most effective results.

Avoid splashing. It causes waste, reduces the cooling effect, and is not conducive to cleanliness and prevention of accidents and fire hazards. Splash guards can be easily provided, thus preventing the coolant from splashing over machine tool and onto the floor.

Modern machine tools are equipped with efficient and economical self-contained circulating systems. Large manufacturing establishments are often served by central circulating systems.

In the self-contained systems, one or two oil reservoirs are located in the base of the machine tool or close by it. The reservoir must be large enough so that it need be filled to only two-thirds of its capacity. This permits the oil or coolant to settle and to cool. If two tanks are provided, the supply of fluid can be alternated while one tank is permitted to settle and cool.

Apply Lubricants Correctly



EXERCISE GREAT CARE in the selection of appliances in order that the correct lubricants may be supplied unfailingly to the right point and in the required quantity. Appliances must be easily accessible, and servicing them must not involve a safety hazard. Keep clean and in good operating order.

- *Non-automatic appliances*, such as pushbutton oilers, oil cans, paddles, swabs, and brushes can be wasteful, unreliable, and inefficient. They involve the human element, and negligence may result in damage to equipment. Drop-feed oilers are a considerable improvement over hand oilers. They are adjustable to a certain degree. Regularity, efficiency, and economy of feed are affected by the oil level, oil temperature, and extraneous dust or dirt.

- *Wick-feed oilers*, properly designed and maintained, give good results, but are limited in application, and are affected by temperature fluctuations.

- *Compression grease cups* do not eliminate the human element, and do not always protect the grease from extraneous grit and dirt.

- *Grease-packed applications* are quite reliable and economical for inclosed bearings protected by properly designed and maintained seals which prevent the grease from leaking and protect it against outside impurities. Most seals now contain synthetic rubber and may be affected by certain lubricants.

- *Pressure application* of grease by means of manually operated guns and fittings of various designs represents a decided improvement over the grease cup. These appliances simplify labor routine, are efficient, and protect the grease from impurities, but may cause overfilling of bearings.

- *Automatic appliances*, on the other hand, are more dependable and economical in the long run.

- *Bottle oilers* are limited in application, but are adjustable, reliable, and fairly efficient.

- *Automatic grease cups* are equipped with feed control and indicators showing the quantity of grease in the cup. They may be serviced by piping from a central system.

- *Fully automatic lubrication* has proved to be more efficient, more easily adjustable, more reliable, and more economical in the long run for modern machinery operating continuously and under severe conditions. It is the safest method so far as errors or omissions by the operators are concerned.

- Many of the modern machines are equipped with *self-contained systems* which lubricate the bearings and gears. The moving parts are lubricated by means of ring, chain, or collar oiling, and flood, bath, or splash lubrication. The oil in the reservoir is kept at the level indicated by the manufacturer.

- *Circulating systems* operate either by gravity from an overhead oil tank to which the oil is returned from a collecting sump by means of a pump, or by a pressure force-feed system, embodying a pump or mechanical lubricator. These systems are efficient and economical, permit the oil to cool during use, and thereby extend the life of oil and equipment.

- *Centralized systems* are suitable for lubricating light- and heavy-duty machinery with oil or grease. The pump may be hand operated, driven from a rotating or moving part of the machine or machine tool, or by electric motor.

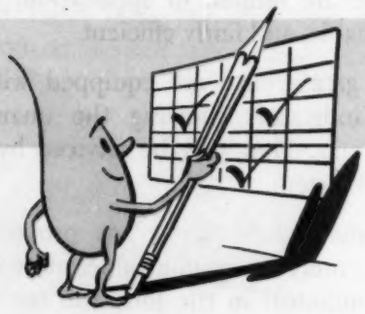
These systems are especially suitable for large shops or mills where groups of machines with a large number of lubrication points are served from one pump unit. Control or metering valves at each lubrication point on a single-line or dual-line system feed a predetermined amount of lubricant, and an indicator at the pump provides visible proof that each point has been served.

- In large shops and mills the handling, storing, and purification of lubricants and metal-working fluids are centralized. Emulsifying oils are mixed

with water in a central tank and the coolants distributed to the machine reservoirs by pipelines. This method assures correct and uniform quality, also a saving of soluble oil during preparation of the emulsions.

Mixing of soluble oil at each machine is usually wasteful and inaccurate. Centralized lubrication helps to keep lubricants cleaner and provides closer control of consumption and stocks. Tanks can be kept clean and at an even, controlled temperature.

The various petroleum products needed in large shops or mills, such as kerosene, lubricating oils, soluble oils, flushing oil, and grease, can be pumped from the central station tanks through individual lines to the points of use. Return lines bring the used oil from the sump at each machine to settling tanks located at the central station, where it is purified and prepared for further use.



Schedule Lubrication

MOST MANUFACTURERS OF MACHINERY recommend certain inspection, refilling, and drainage schedules for the various points in the lubricating systems of their equipment. Thorough and conscientious observations of these "time-tables" assume an increased importance under wartime conditions which require uninterrupted operation of machinery and maintenance of high production schedules.

Well-planned lubricating schedules save lubricants and minimize time out for repairs and extended shutdowns. Lubricating engineers in the service of oil companies are available to make a study of equipment, operating conditions, and production schedules, and to prepare lubricating diagrams for each machine and machine tool, showing the points of lubrication, type and grade of lubricant required, and a time-table of application and oil change. Such diagrams placed on or close to each machine guide the operator in this important phase of his duties.

In large plants or shops it is common practice to train one or more employees as "oilers." This saves valuable production time, and assures regular and adequate lubrication of all the equipment. Records kept on lubricating charts assist in establishing dependable schedules and provide a check for the plant manager. The "oilers" also repair small leaks they find in lines and pumps.

Greasing schedules for bearings can be established only by experience. Certain bearings on a machine are subjected to more severe service than others. Friction-type or plain bearings require more frequent lubrication than antifriction bearings. Frequently they have to be greased every few hours; ball and roller bearings properly packed may run as long as a year without regreasing. The best rule is to comply with manufacturers' recommendations.

The soap base in greases serves as a means to keep the oil in suspension. It is the oil in a grease that adheres to the surfaces of bearings or gear teeth in operation. Part of this oil is either gradually broken down or lost by evaporation, centrifugal force, or leakage. In due course this consumption depletes the grease supply in the housing, and it must be replenished, or, if the grease has become useless, it must be removed and replaced by fresh grease. Under favorable operating conditions, when consumption is low, the time intervals may be safely extended over a long period until oxidation of the grease sets in. Under severe load and high temperature conditions the grease supply must be replenished more frequently, since oxidation occurs in a shorter period.

It is always good practice to remove all the grease about once a year before oxidation or hardening causes the grease to lose its lubricating value. Before refilling with fresh grease, clean the housing thoroughly in order to remove all the small particles of metal, oxidation products, and foreign matter that may have accumulated therein, so that they cannot contaminate the fresh grease.

Check Condition of Lubricant

IT MUST BE BORNE IN MIND that all lubricants — oils, greases, hydraulic oils, and metal working fluids — are subjected in service to contamination, pressure, and temperature conditions, which tend to effect a change in their original physical and chemical characteristics. They gradually deteriorate and become unfit for service.

A laboratory check of the lubricants, hydraulic oils, and metal-working fluids in service in the different machines or machine tools is the safest and most dependable method to determine actual condition and fitness.

If laboratory facilities and personnel are not available at a plant or shop, established oil companies are prepared to have samples taken at certain intervals and tested in their laboratories. A proper correlation of the test results with the service time of the machines and with prevailing operating and atmospheric conditions enables the lubricating engineer to recommend safe schedules for draining and changing the oil.

Keep Systems Clean

BEFORE REFILLING THE SYSTEM with fresh lubricating or hydraulic oil or with cutting or grinding fluid, be sure that tanks, pumps, piping, valves, and controls are thoroughly cleaned. Use a standard proprietary approved cleaning solution in hydraulic systems, or flushing oil in other systems, to flush the system after it has been drained in order to remove all deposits of carbon, sludge, gum, or fine settlings, which accumulate in machines and eventually find their way into the oil reservoirs and tanks, and may contaminate the fresh charge.

Do not use water or steam because it is practically impossible to remove all traces of moisture, which will contaminate fresh oil.

Discourage the use of dirty gasoline for washing bearings or gears. It may contain sand, rust, or other abrasive materials which are harmful to the finish and contaminate the lubricant. The best method to clean a bearing or gear is to soak it in kerosene at about 100 degrees Fahrenheit, and then flush it with a light mineral oil.

Recover by Purification

AIR FILTERS, strainers, and continuously cleanable mechanical filters, temperature controls, and oil coolers, properly placed on machines and pumps in feed lines of lubricating and hydraulic systems, aid substantially in maintaining the quality of lubricants, hydraulic oils, and cutting oils.

A substantial percentage of used oil can be recovered by purification. But purification cannot fully restore the original high quality of an oil. So do not use purified or recovered oils in their original application in delicate hydraulic systems, turbines, etc. Based on reliable laboratory analysis, they still may give service in less severe or less delicate operations. Even if their condition is such that they can be used only as fuel oil, they will contribute to the conservation of the limited supply of petroleum products. Quenching and tempering oils which have been in continuous severe service over long periods of time can be used as fuel oil after scale, rust, and products of oxidation

have been removed by settling and purification.

Greases, with the exception of a few grades used in steel mills and in railroad service, cannot be successfully reclaimed and used again.

Batch purification requires comparatively simple equipment which can usually be built from available scrap. Old drums or barrels and a few short pieces of pipe are used. The oil is permitted to rest in one tank, preferably equipped with steam-heating coils, for several days. Water, sludge, and other impurities settle to the bottom, either sloped or conical in shape, and can be withdrawn. The overhead clarified oil is carefully transferred by means of a swing pipe or float suction into the second tank, without causing agitation and remixing of the settlings and oil, and is ready for use.

Continuous purification provides for clarification of the oil during circulation through the system. Screening removes coarse foreign particles, such as chips, rust, and scale, whereupon the oil is filtered through one of the many types of efficient gravity filters on the market. The viscosity of the oil, its condition, and the required hourly filter rate determine the size of the filter.

Pressure filters of various designs are used for the clarification of heavier-bodied oils or in closed systems where pressure is maintained. The oil is forced through a filter medium, such as paper, cloth, fine screens, felt packs, fuller's earth, synthetic filter media, etc., on which the impurities are retained. Take care in selecting the filter media, so that they will not affect the quality of certain oils containing additives and inhibitors.

Centrifugal purification makes use of centrifugal force to separate substances of different specific gravities from thin layers of oil. It removes water, dirt, chips and metallic particles, insoluble sludge, etc., which are quickly thrown out while the clarified oil is returned to the system.

The centrifuges are sometimes portable so that they can be moved from one machine to another. In large plants they are usually stationary and form part of the central lubricating system.

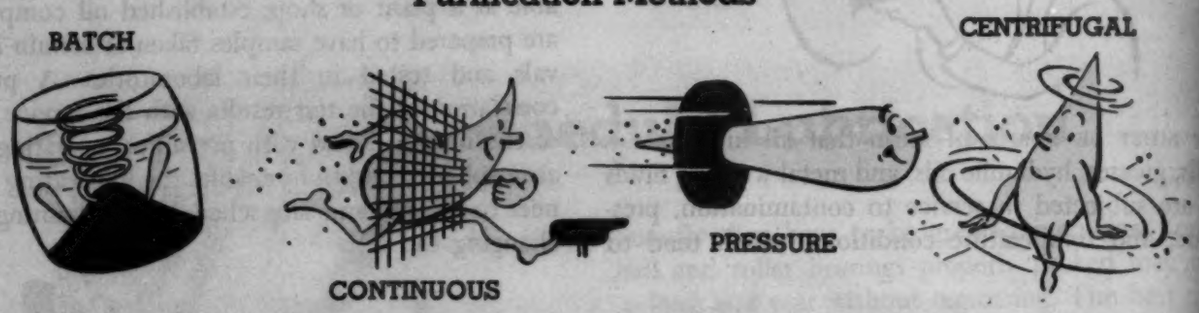
To extend the service life of cutting fluids, the oil is first separated from larger chips and abrasive particles by settling in the sump or tank by means of strainers or screens over baskets. In large steel mills, electro-magnetic chip extractors are used.

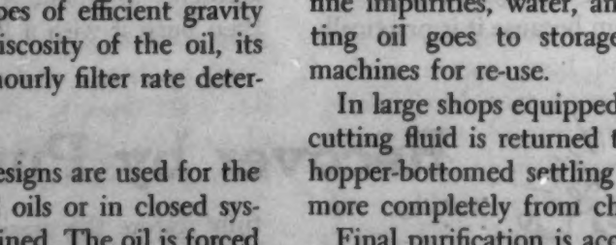
Chip wringers, through the application of centrifugal force, recover as high as 98 percent of oil clinging to the chips. Centrifuges then separate all the fine impurities, water, and sludge, before the cutting oil goes to storage or is returned to the machines for re-use.

In large shops equipped with central systems, the cutting fluid is returned through pipelines to large hopper-bottomed settling tanks to separate the oil more completely from chips and grindings.

Final purification is accomplished in centrifuges. The heat from steam coils is also utilized to sterilize the fluid by heating it at a temperature of about 140 degrees for 30 to 60 minutes. The purified oil goes to storage tanks and is ready for further use.

Purification Methods





Reciprocating compressor imposes peak loads; hence the use of a Class A motor

What Squirrel-Cage Motor?

WPB'S General Conservation Order L-221, forcing wider use of squirrel-cage induction motors, was prompted by the need to conserve critical materials and labor. It enforces a policy that is sound for every motor user, in wartime or in peace

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SQUIRREL-CAGE MOTOR TYPES are not thoroughly understood, or fully utilized. This situation exists despite the fact that these motors have been well standardized. Long ago the National Electrical Manufacturers Association established standard dimensions and electrical characteristics that make it possible for every make of squirrel-cage motor of the same rating to be readily interchanged. And standardization by the Edison Electric Institute and other utility bodies has provided the proper service voltages, frequencies, and number of phases.

Most motor users also recognize the popularity of such motors, and know that they operate in more applications in our factories than any other single type of electric motor. Invariably, today's war plant utilizing three-phase electrical energy at 220, 440, or 550 volts, is using on all except special applications one or more of over 30 kinds of the simplest, sturdiest, most trouble-free and economical motor available.

There is failure, nevertheless, to appreciate all the good points of squirrel-cage motors and apply them to the best advantage. It is profitable, and a patriotic duty as well, to use these motors to the fullest extent, and to apply them properly. It is vitally important to the war effort that strategic materials and man-hours be saved, as they obviously can be in mass-producing standard squirrel-cage motors. Furthermore, mass production and assembly of ½ to 75-hp. squirrel-cage motors means that they can be obtained with the minimum delay. Spare parts also are readily available.

When applying squirrel-cage motors it is important to keep in mind that

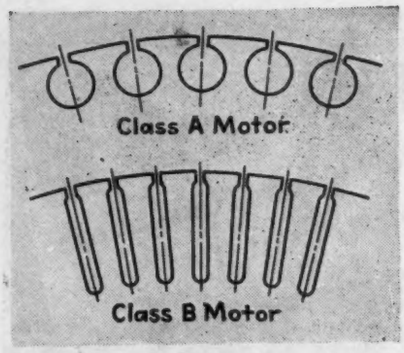


Figure 1. Rotor bars of Class A motors are round, whereas Class B motors have a special-section bar, to provide high reactance

of the six standard NEMA classes (see Table I), A and B apply, generally speaking, to most uses, C and D are for specialized applications, while E and F are used infrequently, except for larger horsepower motors. To assure maximum use of Classes A and B, it is necessary to understand the outstanding differences between them.

In the past, special motors, either cage or other types, have frequently been applied to machines when A or B cage motors would have saved money both in first cost and in maintenance. Most of these instances arose from a lack of complete information on the advantages and disadvantages of the A and B types.

NEMA defines the Class A cage motor as follows:

"A normal-torque, normal-starting-current, squirrel-cage motor is a squirrel-cage induction motor with normal starting torque and low slip at rated load and may have sufficiently high starting current to require in most cases a compensator or resistance starter for motors above 7½ horsepower."

The references to starting current, particularly the suggestion that reduced-voltage starting may be necessary for Class A motors rated above 7½ horsepower can be qualified. The fact is that full-voltage or across-the-line starting is very common for A motors, because usual distribution circuits have sufficient capacity to withstand the starting current inrush of these motors without objectionable effects.

The NEMA definition for Class B cage motors is:

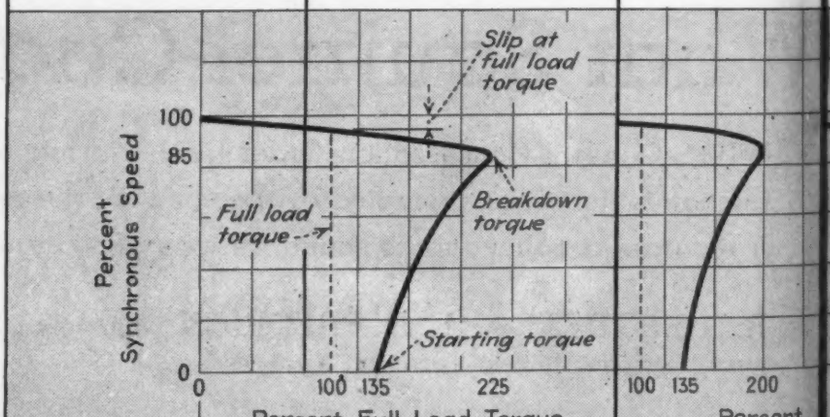
"A normal-torque, low-starting-current, squirrel-cage motor is a squirrel-cage induction motor which develops normal starting torque at *relatively low starting current and can be started at full voltage*. The low starting current is obtained by design of motor to include inherently high reactance. The slip at rated load is relatively low."

The words in italics might make it appear that the Class B cage motor is far superior to the Class A motor because of its lower current inrush, and the consequent ability to use the least expensive starters—the across-the-line type. The notation that "the low starting current is obtained by design of motor to include inherently high reactance" indicates, however, that the advantage of low starting current is relative and may be compensated for by different advantages in the Class A type.

The high reactance in the Class B motor is obtained by designing the rotor with deep, special-section copper bars, as shown in Figure 1. Because of the high reactance, the maximum torque of the B motor is decreased,

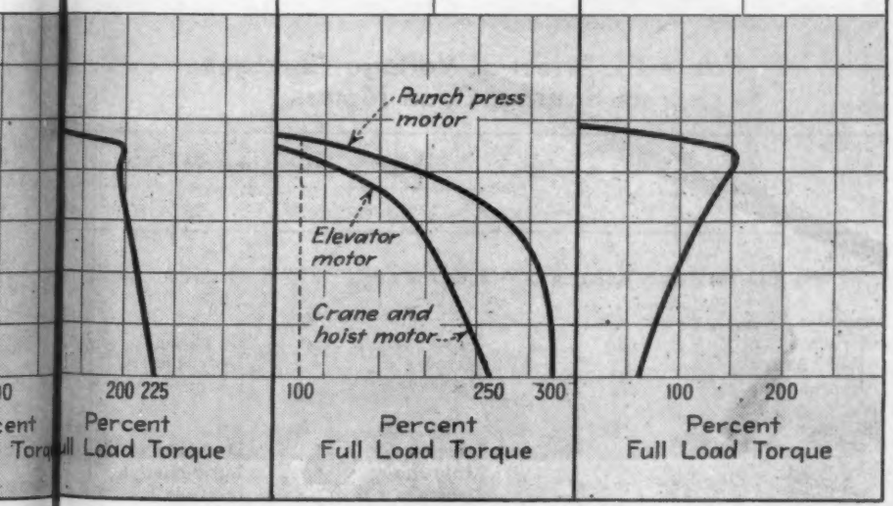
Table I. Electrical Characte

NEMA Type Classification Duty	CLASS A Normal Torque Normal Starting Current Continuous	CLASS B Normal Torque Low Starting Curre Continuous
MAXIMUM STARTING TORQUE	Percent of full-load torque 3600 r.p.m. 2 pole 100 1800 r.p.m. 4 pole 150 1200 r.p.m. 6 pole 135 900 r.p.m. 8 pole 125 720 r.p.m. 10 pole 120 600 r.p.m. 12 pole 115 514 r.p.m. 14 pole 110 450 r.p.m. 16 pole 105	Slightly lower than Class A
MAXIMUM RUNNING TORQUE	Not less than 200 percent of full-load torque	200 percent of full-load torque or more but lower than Class A
STARTING CURRENT (Locked Rotor)	600 to 800 percent of full-load current (Varies with size, number of poles, and voltage)	450 to 600 percent of full-load current
EFFICIENCY	Relatively high even at partial loads. Increases with motor speed and size	Approximately the same as Class A
SLIP (Percent Drop Below Synchronous Speed at Full-Load Torque)	1½ to 5 percent	1½ to 5 percent



ndard Squirrel Cage Motors

CLASS C	CLASS D		CLASS E	CLASS F
h Torque Normal Slip ow Starting Current	High Torque High Slip	High Torque Medium Slip	Low Torque Normal Current	Low Torque Low Current
Continuous	Intermittent	Continuous	Continuous	Continuous
5 percent of full-load torque	250 percent of full-load torque	300 to 400 percent of full-load torque	Not less than 50 percent of full-load torque	Not less than 50 percent of full-load torque
o percent of full-load torque	250 percent of full-load torque	300 to 400 percent of full-load torque	150 percent of full-load torque	150 percent of full-load torque
Approximately the same as Class B	300 to 500 percent of full-load current	400 to 800 percent of full-load current	Same as Class A	350 to 550 percent of full-load current
Lower than Class A	Relatively low	Comparable to Class A	Comparable to Class A	Comparable to Class A
3 to 7 percent	12 to 16 percent	5 to 13 percent	1 to 3½ percent	1 to 3½ percent



although the starting torque remains identical with that of the A motor.

Figure 2 shows the relative speed-torque and speed-current curves of Class A and Class B motors.

Before discussing the important maximum torque characteristic, let us dispose of other, less essential, differences. One of these is power factor. The difference is important only for larger motors, or large numbers of small motors supplied from a common line.

The efficiencies of the two classes are practically identical.

Since, in ratings below 7½ horsepower, A motors normally do not require a reduced-voltage starter, the standard construction of motors in this range is the class A machine, and the class B is unnecessary. Therefore, when Class B motors were developed, they were limited to horsepower ratings of 7½ and over (see Table II).

It will be seen from Figure 2 that A motors have a higher maximum torque than B motors. This characteristic increases the short-time peak load capacity of A motors, and is of the greatest importance in deciding between the use of A or B motors for any application.

For example, consider a drive that occasionally is called upon to carry a short-time peak load of 200 percent of full-load torque, a peak for which the time-delay of the starter overload relay is sufficient. At that value of load the typical class A motor (see Figure 2) will draw approximately 215 percent of rated current. For the same value of peak load torque the Class B motor will draw a current of about 250 percent of full-load value. Obviously, the effect of peak loads will be more severe on the Class B motor than on the Class A.

This example is typical of the relative difference in the short-time peak-load capacities of A and B motors rated 7½ horsepower and above at any speed. Now the most popular speed is 1800 r.p.m. for motors rated 25 horsepower and below. It is required by WPB Limitation Order L-221 for 60-cycle motors rated 25 horsepower and below, with corresponding speeds at other frequencies.

In general, WPB Order L-221 lowers the peacetime severe peak-load carrying capacity by specifying:

Horsepower Loading. The following standards shall be applied in determining horsepower loads for motor ratings:

(I) Horsepower required for purposes of ascertaining load as provided herein shall be determined by test, or, where test is impossible, by careful calculation or comparison with known power requirements of similar apparatus.

(II) Where the motor rated voltage

Table II. Standard Horsepower Ratings of Class A and Class B Motors

CLASS A Horsepower		CLASS B Horsepower	
½	15	—	15
¾	20	—	20
1	25	—	25
1½	30	—	30
2	40	—	40
3	50	—	50
5	60	—	60
7½	75	7½	75
10	—	10	—

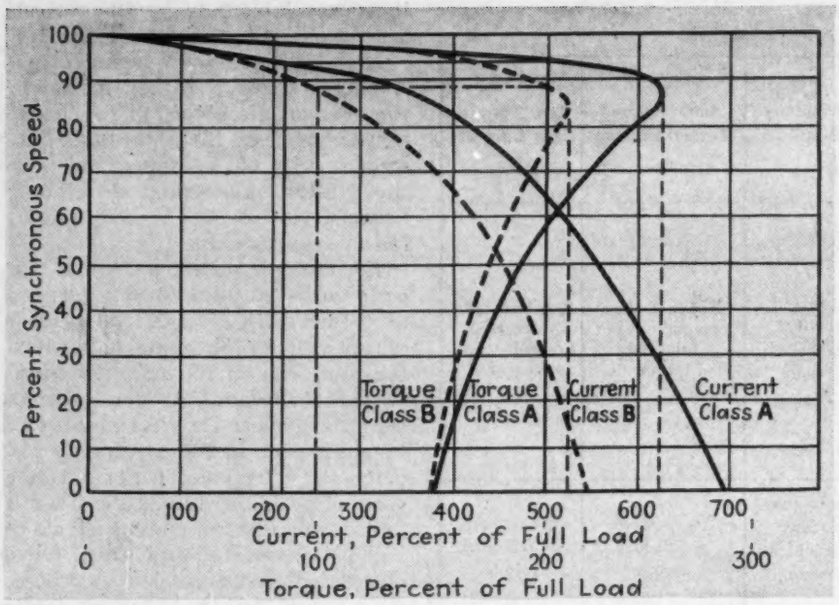


Figure 2. These speed-torque curves for Class A and Class B motors show that A has greater overload capacity, is less likely to stall

will be maintained and the ambient temperature, normally, will be below 40 degrees Centigrade, will only occasionally, and for short periods, equal or exceed 40 degrees Centigrade, (a) in the case of alternating-current motors rated 40 degrees Centigrade open type, continuous duty, the horsepower rating shall be not more than 80 percent of the determined horsepower load; (b) in the case of alternating-current or direct-current motors rated 50 degrees Centigrade semi-inclosed, or 55 degrees Centigrade totally inclosed, continuous duty, the horsepower rating shall be not more than 91 percent of the determined horsepower load; and (c) in the case of direct-current motors rated 40 degrees Centigrade open type, continuous duty, the horsepower rating shall be not more than 87 percent of the determined horsepower load; *provided, however,* that in any case where the application of any of the above formulae results in a horsepower rating which is not a standard horsepower rating, the rating may be the standard horsepower rating next above the rating resulting from the application of the formula.

Example: Where the horsepower required as determined in subdivision (I), is 9.3, of which 80 percent would be 7.44, a motor not exceeding 7.5 standard horsepower should be delivered.

Before the war emergency, a drive that required 22 brake horsepower would ordinarily have been driven by a 25-hp. motor. Now, however, a 20-hp. motor is considered adequate to fulfill the duty. If the motor is then subjected to severe peaks, obviously a Class A cage motor with a large value of maximum torque is more capable of withstanding these peaks, whereas the B motor would have less reserve capacity to overcome them.

With production moving at the wartime pace, most supply lines are heavily loaded. At times this heavy loading may lower the voltage supplied to the motor.

The torques of a cage motor vary approximately as the square of the applied voltage. Therefore, if the voltage is 10 percent low the torques available from this motor are decreased 19 percent. With the Class A motor mentioned previously, which was called upon to deliver, a short-time peak of 200 percent of full-load torque, a drop in applied voltage to 90 percent of normal value would decrease the breakdown torque (see dotted straight lines in Figure 2) from 200 percent to almost 200 percent. Under the same conditions, the breakdown torque of the Class B motor would drop from 210 percent to 165 percent, which would obviously cause the motor to stall.

Table III shows the effect of low voltage on the characteristics of squirrel-cage motors. It indicates that the reduction of voltage is likely to be more detrimental to the continued operation of Class B than Class A motors, since Class A is inherently capable of withstanding peak loads.

On the basis of these considerations it is evident that the Class A motor is important—especially for wartime drives. Where the load is steady and the maximum torque is never approached, the major advantage of this class is minimized. When peak load requirements, however, are considered as important as the usual considerations of starting current or inrush, it should be an easy matter to decide how to use A or B cage motors for the majority of industry's drives. Where production machines are subjected to severe peak loads, the use of Class A motors will save production delays and maintenance man-hours.

Table III. Effect of Voltage Changes on Squirrel-Cage Motors

CHARACTERISTIC	Voltage (in percent of rated value)	
	110	90
Torque		
Starting and Maximum Running	Increase 21%	Decrease 19%
Speed		
Synchronous	No change	No change
Full Load	Increase 1%	Decrease 1.5%
Percent Slip	Decrease 17%	Increase 23%
Efficiency		
Full Load	Increase 0.5 to 1%	Decrease 2%
¾ Load	Little change	Little change
½ Load	Decrease 1 to 2%	Increase 1 to 2%
Power Factor		
Full Load	Decrease 3%	Increase 1%
¾ Load	Decrease 4%	Increase 2 to 3%
½ Load	Decrease 5 to 6%	Increase 4 to 5%
Current		
Starting	Increase 10 to 12%	Decrease 10 to 12%
Full Load	Decrease 7%	Increase 11%
Temperature Rise	Decrease 3 to 4° C.	Increase 6 to 7° C.
Maximum Overload Capacity	Increase 21%	Decrease 19%
Magnetic Noise	Slight increase	Slight decrease

A new generation of industrial workers is learning about Exide dependability!

New workers are enlisting every day in America's industrial battle. Many of them have been unfamiliar with motive power batteries and the equipment powered by dependable Exides . . . but that picture is changing fast. The simplicity, efficiency, and long life of Exide Ironclad Batteries is convincing these new workers of something experienced operators have always known . . .

Exide IRONCLAD BATTERIES

. . . are leading a war of movement on the home front!

ANY WORKER CAN FOLLOW THESE EASY MAINTENANCE STEPS . . .

Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.

Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.

Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long life built into every Exide Battery. Ask for booklet form 1982.

Exide IRONCLAD BATTERIES

1 **High Power, More Production:** To get the most from any battery-powered electric vehicle, its battery must deliver good voltage, hold that voltage high, and be ready for emergency demands with a giant surge when needed. Exide Ironclads do just that.

2 **Long Life, Saves Materials:** Rugged Exide Ironclads are built to last, and save vital materials by getting maximum use from everything that goes into their making. When you buy an Exide you definitely —Buy to Last and Save to Win!

3 **Easy Maintenance Saves Labor:** Exides are kept charged by the simplest method ever devised. With the Exide Charge Control Unit there's nothing to do but connect the battery to the charging source and turn a knob.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
Exide Batteries of Canada, Limited, Toronto

Here's Preventive Upkeep

F. L. PYLE, Works Engineer, Pershing Road Plant, Link-Belt Company, Chicago

Maintenance problems at the Link-Belt Company plant on Pershing Road, Chicago, are more diversified than in most industrial plants. Our solutions range from extremes of prevention to emergency correction.

In the power house, upon which the operation of the entire plant depends, we use all the prevention we can. The chief engineer spends much of his time inspecting stokers, boilers, engines, generators, compressors, and auxiliary equipment. This constant examination of equipment makes

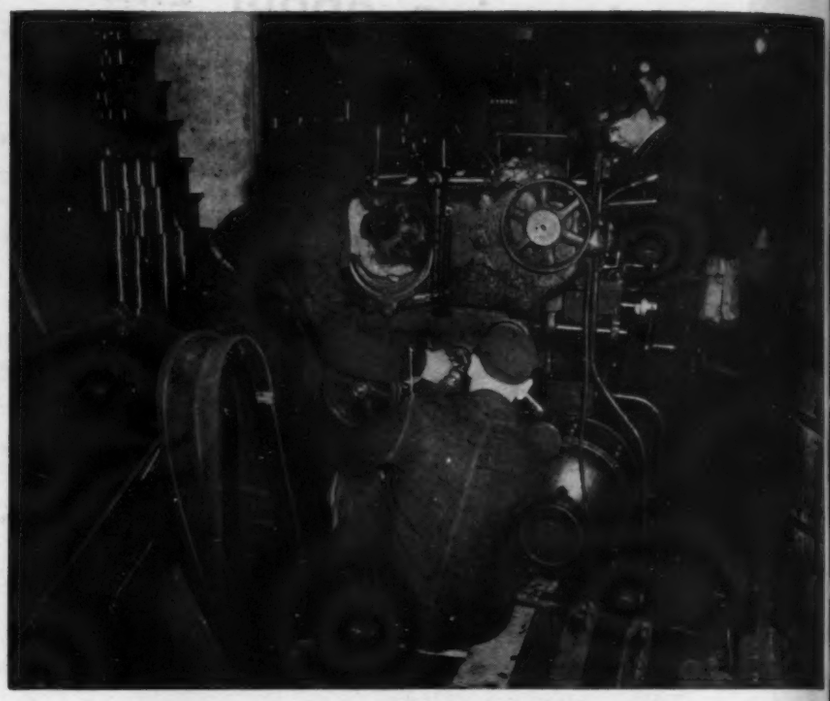
★ The well-maintained plant is the high-production plant

possible the repairing of defective parts before failure occurs. Except for a major repair, the power plant crew does all its own maintenance. We keep all openings to the boiler and engine rooms locked and permit only the crew and certain authorized individuals to enter. The value of the power house program is shown by the long, uninterrupted service supplied by plant and crew.

Our general maintenance crews operate from a balcony along one side of a large assembly floor. Work is scheduled so that one or more men of each maintenance classification are usually at work on the balcony. When a breakdown occurs, the foreman of the department affected goes to a whistle cord and blows a coded signal. This cord is within sight of the balcony and the maintenance man can see the foreman and obtain the location of the trouble. The code indicates whether a millwright, carpenter, plumber, or electrician is needed.

This system is used only for emergencies. Normal notification that maintenance is needed comes from many sources—heads of departments, department foremen, the men and women themselves, watchmen, and occasionally the works engineer. Inspectors from the state, city, and insurance companies also point out jobs to be done. Most of the maintenance orders reach the maintenance foreman from the heads of departments. Anything that is serious or costly is brought to my attention.

In normal procedure, the items for carpenter, millwright, and yard work



Nowadays regular maintenance is scheduled for whatever time will cause least disturbance to production. When an emergency occurs as many men as can be used on the job are rushed to the spot

Motors are cleaned, inspected, and lubricated twice a month. The three men assigned to this work also oil all lineshaft bearings, and check, tighten, and dress all the belts in the plant

Modern Molly Pitchers

Symbolizing the aroused spirit of a fighting America are those women who have set aside customary feminine pursuits to help "man" our production lines.

In the manufacture of precision roller bearings, women have served for years but in the present emergency, their ranks at Hyatt have been swelled by hundreds.

They are the modern Molly Pitchers carrying on the tradition of that brave Revolutionary matron who, after her husband had fallen, kept blazing away with his cannon.

At Hyatt, however, it's more than an allegory.

Our women war workers have banded together in a Molly Pitcher organization of their own to serve further their Hyatt buddies on the firing line.

In addition to making sure that they get more bearings for planes, tanks, ships and guns, these women knit...write letters...send books and cigarettes...while many also find time to aid in civil defense, U. S. O and Red Cross.

Such spirit, such strength, such sacrifice cannot lose.

Thus, do we pay tribute to our own Molly Pitchers and salute all the other women war workers of America.

Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

HYATT ROLLER BEARINGS

Servicing grease-lubricated bearings is made easier by a hand-operated grease gun mounted on wheels

Replacing ball bearings on a fan shaft is all part of the day's work for skilled maintenance mechanics

are listed on bulletin boards outside my office. A clerk prepares time cards for all jobs and places them on racks in the maintenance offices. The maintenance foremen assign the jobs to their men by placing the cards in the rack pockets of the men to whom the work is allocated.

Each machine operator is responsible for his machine. He must keep the machine **cleaned, oiled, and inspected.** He must report any defects or damage. He makes the report to his foreman, who looks over the machine and notifies the maintenance department. If the trouble is of emergency nature, he uses the whistle. If normal service is adequate, repair is scheduled for any time the machine is shut down. Because of 24-hour operation, it is often difficult to find a shutdown period. Maintenance then has to be scheduled so as to cause the least disturbance to production.

When an emergency does occur, we concentrate as many men as can be used on the job. Recently two large cranes broke down on the same afternoon. These breakdowns were of major importance and required nearly all our maintenance men for many hours of overtime. Although these cranes had been periodically inspected, no indication of the cause of the failure had become apparent. We do not feel that any normal care would have prevented the failures.

To reduce corrective maintenance, we follow a limited plan of preventive maintenance in most of our factory. We have a group of three men, designated as belt men and oilers, who follow a routine schedule. These men check, tighten, and dress belts. They clean and lubricate all motors, line-shaft bearings, and similar equipment. The schedule is so arranged that all motors and belts are checked once every two weeks. Equipment that requires additional attention is scheduled for extra inspections.

Two men devote full time to cleaning lights and reflectors. Lighting equipment is cleaned by departments, on schedule, and the foundry fixtures are cleaned more frequently than any others.

The foundry uses preventive maintenance on cupolas, converters, and ladles, as well as on all other equipment. Crane chains throughout the plant are frequently inspected, but chains on foundry cranes receive special attention.

Always on the Watch

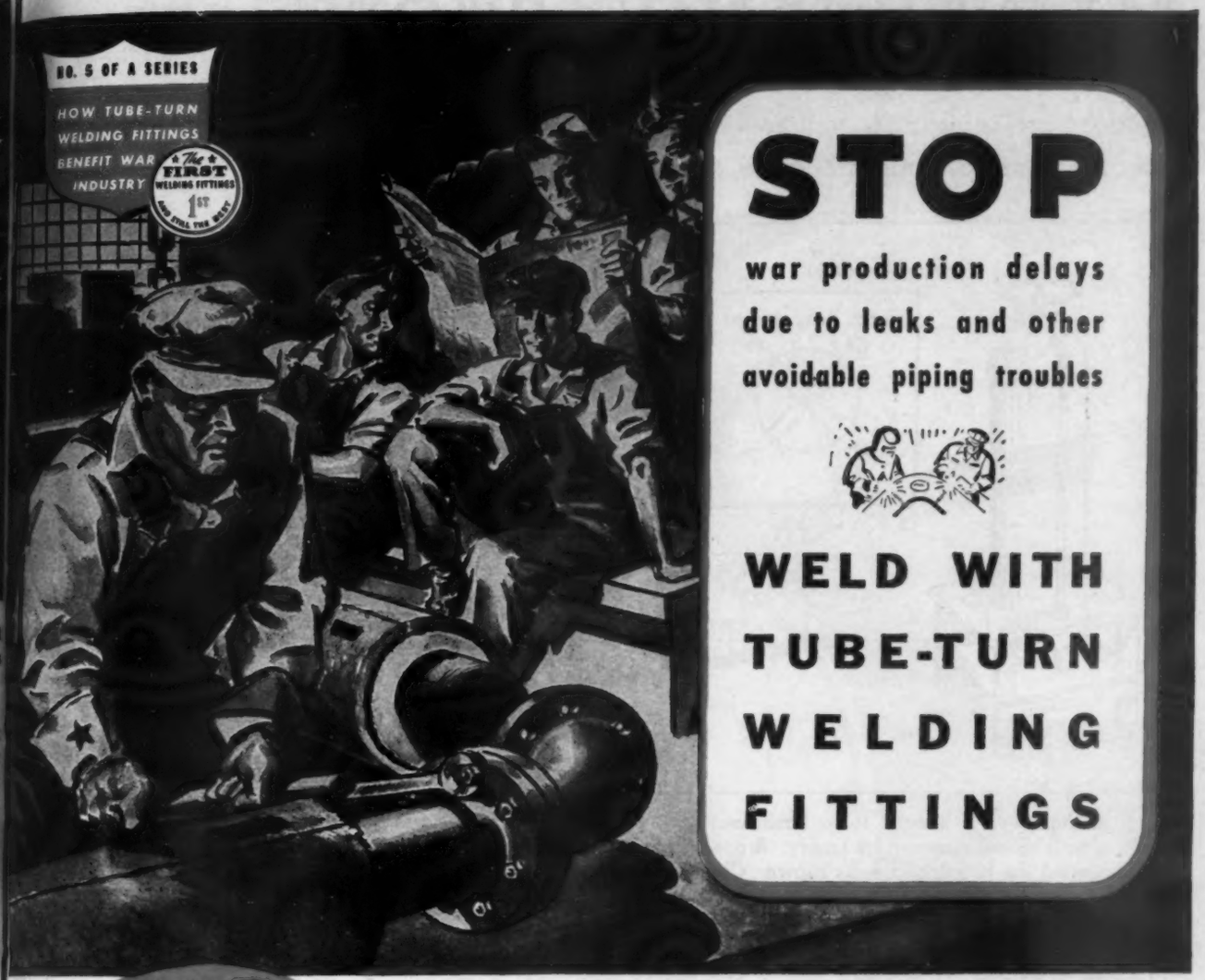
We make frequent inspections and tests of our sprinkler systems, hoses, and fire pumps. We watch fuse bodies for discoloration, which is a warning of overload that permits correction of the trouble before it becomes serious.

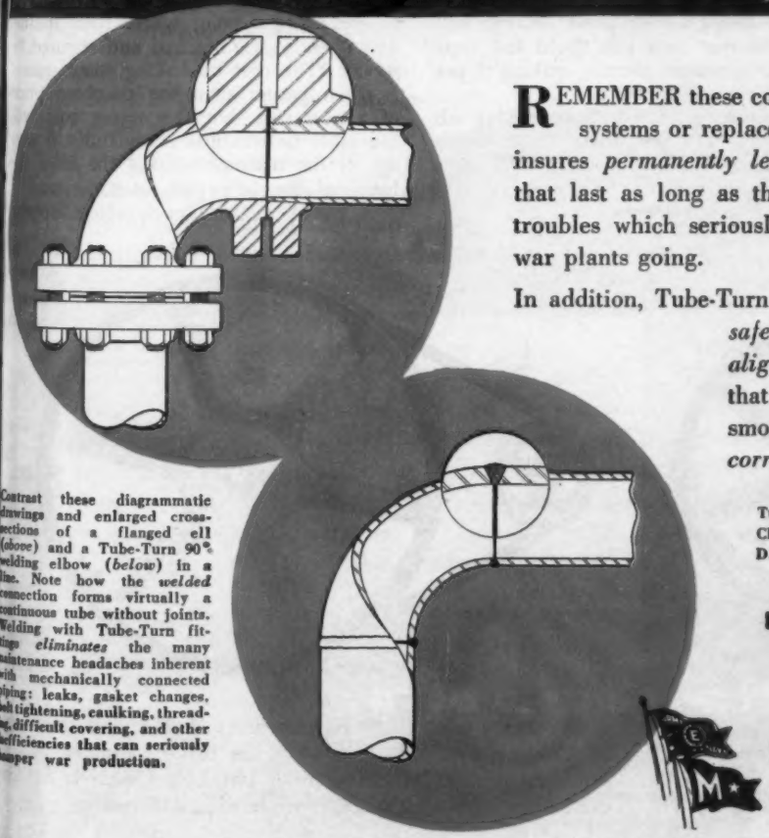
Each summer we carefully examine the more than 300,000 square feet of our roofs. Bubbles are opened, seams fastened down, flashings repaired, dried-out sections mopped, and large areas resurfaced. After this job is completed, the appearance of a puddle on the floor sends an inspector on a hunt for the unrepaired leak.

We use a lot of paint to keep our plant in good condition. Before we buy a new paint, we apply a sample to numbered panels and run tests. Only after the new paint has been proved equal or superior to the paint we are applying do we accept it. This simple process has saved us time, money, and headaches. We keep all steel painted to prevent rust, but sometimes we are not successful, and then we do a cleaning job before we repaint.

We operate more than 85 electric welding machines. The maintenance on these machines is handled by the electricians, who have all electrical equipment under their jurisdiction for inspection, test, and repair. Routine insulation tests are made on welders and other electrical equipment. When the insulation resistance becomes low, the unit is removed from service and repairs are made.

We have tried out several maintenance procedures, and find the one we now follow is best suited to our needs. We have tried doing nearly all maintenance work on Sunday. Production schedules, swing shifts, and maintenance personnel objections interfered and the arrangement was not workable. Now we do as much as we can at night, or during off-hours in various departments. The foundry, where maintenance work is always heavy, has long periods when it is inactive. Nearly all preventive, and some corrective, work is carried on all the time, without interrupting machines or production.


NO. 5 OF A SERIES
HOW TUBE-TURN WELDING FITTINGS BENEFIT WAR INDUSTRY
The 1st FIRST WELDING FITTINGS 1ST AND STILL THE BEST
STOP
war production delays due to leaks and other avoidable piping troubles
WELD WITH TUBE-TURN WELDING FITTINGS



Contrast these diagrammatic drawings and enlarged cross-sections of a flanged ell (*above*) and a Tube-Turn 90° welding elbow (*below*) in a line. Note how the *welded* connection forms virtually a continuous tube without joints. Welding with Tube-Turn fittings *eliminates* the many maintenance headaches inherent with mechanically connected piping: leaks, gasket changes, bolt tightening, caulking, threading, difficult covering, and other inefficiencies that can seriously hamper war production.

REMEMBER these common-sense facts before you install new piping systems or replace old sections: welding with Tube-Turn fittings insures *permanently leakproof, trouble-free joints* and better fittings that last as long as the pipe itself. You banish many maintenance troubles which seriously interrupt the vital *piping arteries* that keep war plants going.

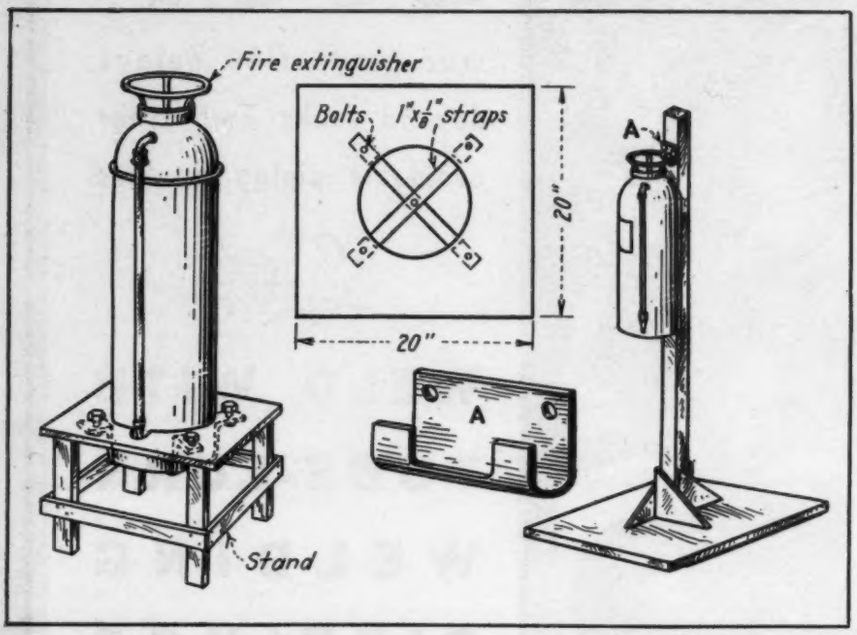
In addition, Tube-Turn welding fittings give you *greater strength and safety;* uniform wall thickness, for *easier, faster alignment and welding;* compact piping layouts that *save space, weight and installation time;* smooth inner walls that mean far *better flow, less corrosion* and *greater piping efficiency.*

TUBE-TURNS (INC.), LOUISVILLE, KY. *Branch offices:* New York, Chicago, Philadelphia, Pittsburgh, Cleveland, Dayton, Washington, D. C., Tulsa, Houston, Los Angeles. *Distributors in principal cities.*

TUBE-TURN
TRADE MARK
Welding Fittings

MAINTENANCE SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary maintenance accomplishments. Accepted articles will be paid for



If an extinguisher is needed for a hazardous job in the middle of a large plant, a wall model may not be handy. Bruce MacIntosh, MacDill Field, Fla., has designed the two floor stands shown. Casters make them portable

Mark Load Limits on Factory Rail Trestles

L. D. PORTER, Cleveland

Wherever pipe trestles or other overhead steel industrial structures cross railroad sidings it is always advisable to mark them legibly with the safe load limit they will carry over and above that which they normally support. Such structures offer ideal attachment points for chain hoists or other tackle which might be used to remove machinery or other heavy equipment from railroad cars spotted beneath. Unless attention is called to their safe load capacity, overloading may cause deflection resulting in damage to pipelines or other equipment which they support.

•

A Simple Way to Repair Plug Cocks

S. H. SLEMAN, New York

Shortages created by the increasing intensity of the war effort very frequently make it necessary that machine parts, which would normally be replaced after wear has progressed to a point where their usefulness is ended, be repaired and restored to service. The cost of making these repairs is often greater than the purchase price of a new part, but this repair cost will ordinarily be returned many times if outage of the machine, during the slow delivery of the new part, is considered.

A typical instance of avoiding lengthy

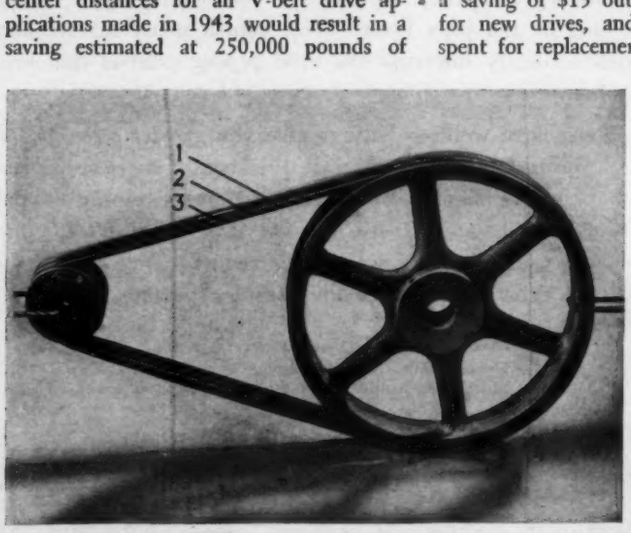
Larger Sheaves Permit Using Fewer V-Belts

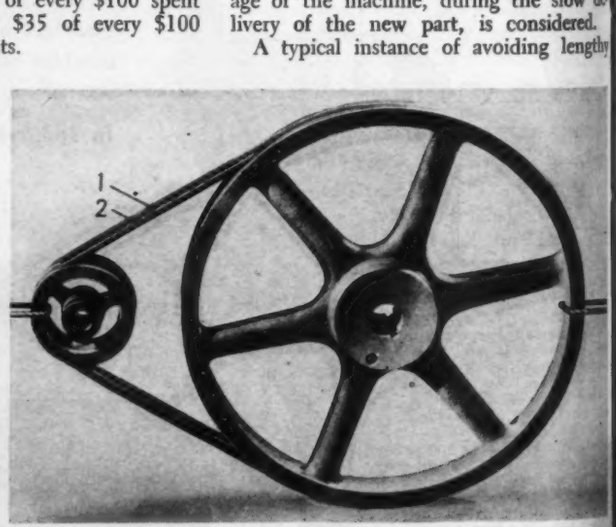
SOURCE—Allis-Chalmers, Milwaukee

Use of slightly larger sheaves and shorter center distances for all V-belt drive applications made in 1943 would result in a saving estimated at 250,000 pounds of crude rubber. It would require 25,000 trees to produce this amount of rubber.

This saving comes about because with larger sheaves both belt speed and capacity are increased, thereby making it possible to use fewer belts.

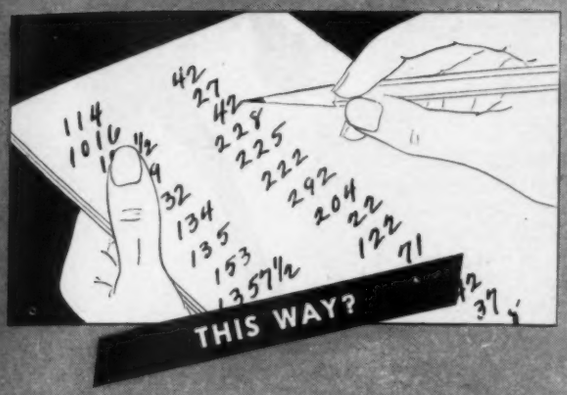
Therefore, in addition to conserving rubber, users of V-belt drives could average a saving of $15 out of every $100 spent for new drives, and $35 of every $100 spent for replacements.

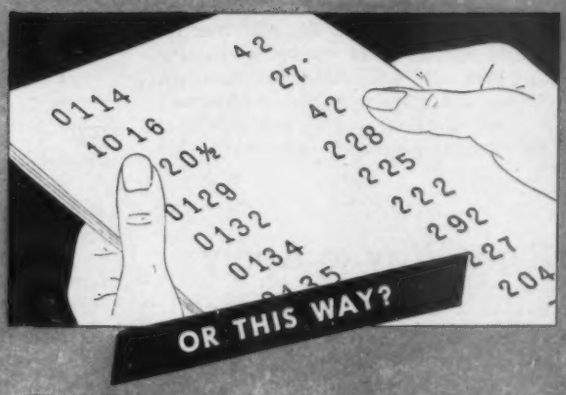


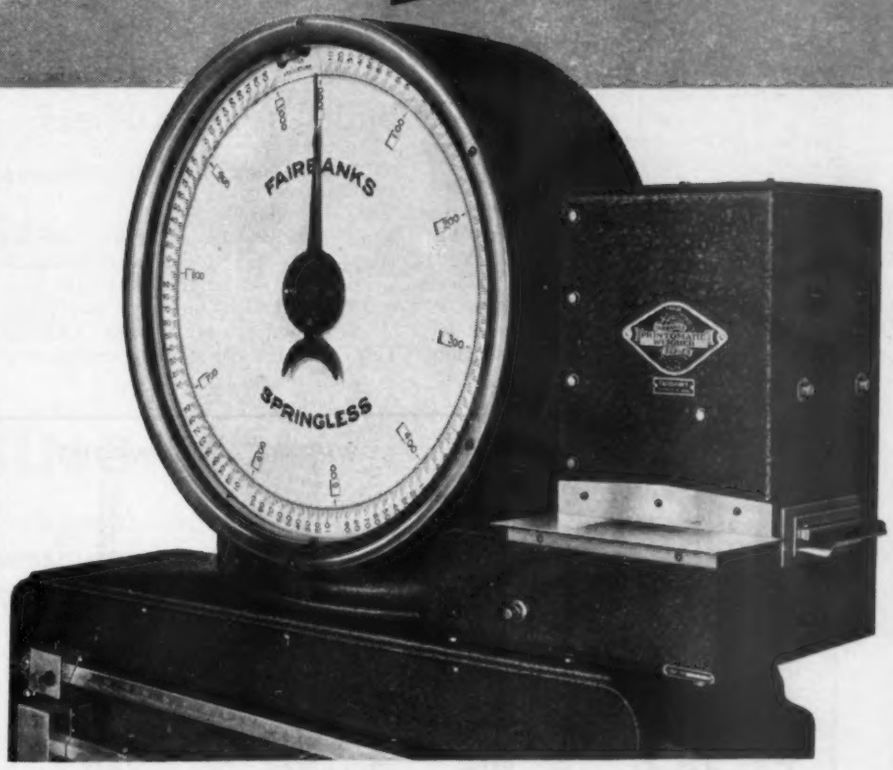


Left, 12-in. and 3-in. sheaves used on a 2-hp. drive (motor speed 1740 r.p.m., full load) result in a belt speed of 1360 f.p.m. Drive capacity is 2.7 horsepower with three belts, or 0.9 horsepower per belt. Right, when 15-in. and 3.8-in. sheaves are used for the same drive, belt speed goes up to 1670 f.p.m. With two belts the drive capacity is 2.8 horsepower, or 1.4 horsepower per belt. Such a set-up could save about 250,000 pounds of crude rubber yearly

How Are Weight Records Made In Your Plant—







For precision weighing and precision recording use Fairbanks Scales with Printomatics

• Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded,* the element of error still remains.

Fairbanks Scales with Printomatics eliminate these human errors—because the scales read the weight automatically and then automatically make a *printed* record of the weight. In addition to eliminating errors, Fairbanks Scales can be fitted into your production flow to do a variety of jobs better than they can be done in any other way. Fairbanks Scales weigh loads in motion . . . count small parts . . . record the flow of liquid chemicals . . . guard secret formulas in compounding . . . control batching . . . automatically control ingredients . . . automatically control aggregates . . . and many other jobs.

The organization which made Fairbanks the greatest name in weighing brings you 113 years of scale manufacturing experience. That, too, is worth serious consideration.

Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

machine outage by repairing a worn out part occurred recently in a large chemical plant. Here the plug cocks controlling compressed air and process liquid to a certain operation were found to be leaking, because the tapered valve plugs were worn considerably undersize. It was decided to repair these plugs.

To do this the plugs were first machined even further undersize and then knurled. Brazing metal was then deposited over the knurled surface until the plug diameter was built up sufficiently to allow machining and grinding to the original size. This job was done quickly and after re-installation the plug cocks gave no trouble.

•

Right Way to Apply Clip Fastenings

F. L. SPANGLER, Chicago

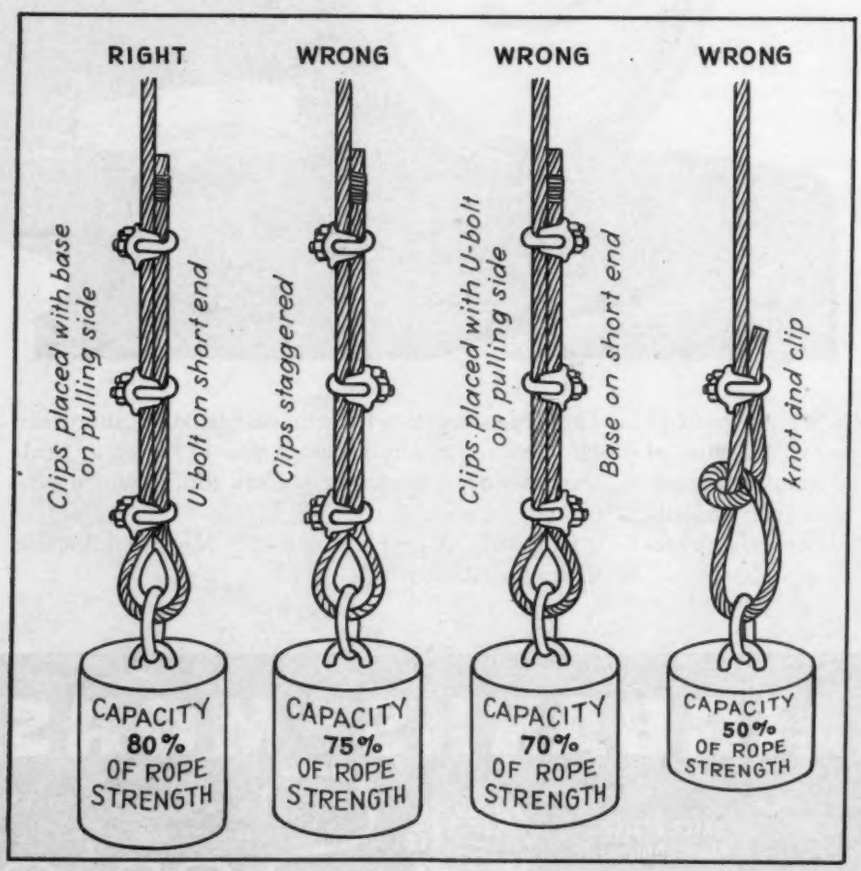
In these days when replacements of wire rope are hard to get, clip fastenings are mighty important. Here are a few do's and don't's on clip application.

Do apply all the clips with the base, or saddle, against the pulling rope and the U-bolt against the short end, instead of staggering them. Evenly space the clips at about six times the rope diameter or more. Don't let the short end slack between clips so it takes none of the load. Don't draw clips too tightly. This reduces their efficiency, and misshapes and weakens the rope. But do see that they are not loose. With the clips fastened, all nuts should again be tightened after the rope has been under tension.

It is important to supply the right number of clips. The following table gives the minimum number recommended for different sizes of rope:

Rope Diameter Inches	*No. of Clips*	*Spacing of Clips Inches*	*Wrench Length Inches*
¼—⅜	3	3	12
½—⅞	4	4½	18
1—1⅛	4	6	24
1¼—1⅜	4	7	24
1½—larger	5—7	10	24

Tighten clips with every rope inspection. It is important to examine the rope at the last clip farthest from the loop or bight. Fatigue breaks often develop at this point because rope vibration or whipping is damped here. Preformed wire rope, which is more flexible and has less tendency to whip, shows less fatigue damage than nonpreformed wire.



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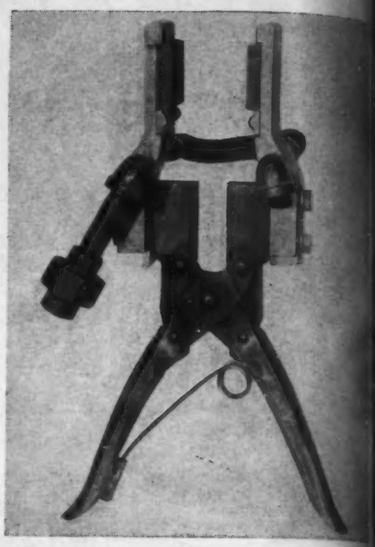
Water-Cooled Tongs Built Up From Pliers

SOURCE—General Electric Company, Schenectady

A new type of equipment has been developed at the Schenectady Works to meet production requirements with silver brazing, in greatly increased use because of the shortage of tin for soldering. This device is a pair of water-cooled tongs



Water-cooled tongs from built-u pliers for use in silver brazing

built up from a pair of 8-in. paralle flat-nose pliers.

The tongs are used as carbon holder in the incandescent carbon process o silver brazing, and are cool, light, and efficient in operation. They are eas to make. Steel blocks are first welded onto the plier jaws to give them an out side width of 1½ inches when closed. These blocks are then drilled and tapped for ⅜-in. bolts. Bar copper of varying dimensions is bent to fit the clearances required for the particular job to be handled, and the tips are cut to hold small blocks of carbon. The bars are drilled and tapped to accommodate ¼-in. pipe fittings to which water-cooled power leads are attached. A rubber hose jumper forms a water connection between the jaws, and additional water carriers may be drilled the entire length of the bars if necessary. Mica sheets and bushings are used for insulation between parts and pliers.

A single-loop pronged spring of 0.091-in. wire, welded at one end and free at the other between the handles of the pliers, provides sufficient force to open the jaws when the braze is completed.

•

Roofing Paper Instead of Sheet Rubber

S. H. COLEMAN, Staunton, Va.

Where sheet rubber packing, ordinarily used to make gaskets for the flanged joints of piping pumps and other hydraulic equipment, is not obtainable a handy substitute is multi-ply roofing paper. This material cuts easily and will ordinarily give long, trouble-free service.

Roofing paper, however, should never be used for extremely warm temperature service, because binding mediums melt at relatively low temperatures. When used as a gasket, consideration should be given its compressibility which is different from that of rubber.

Trade Marks "ScotTissue," "Soft-Tuff," "Washroom Advisory Service" Reg. U. S. Pat. Off.

THE MISSING MAN

The control of sickness starts in your washrooms

"MINOR" ILLNESSES cause more of your absences than any other single factor. Because of sickness, American workers average a week's absence every year—and over half of this lost time is due to the common cold and its complications.

Carefully planned, hygienic washrooms can do much to prevent the spread of contagions. They encourage workers to wash up often . . . particularly before meals. Soap, hot water and individual tissue towels prevent many disease germs from passing from hand to hand . . . from hand to mouth.

A good architect can give you valuable help in designing or remodeling your washrooms. He will arrange fixtures for maximum hygiene and convenience . . . for easy, economical maintenance. He will show ways to make the washroom bright and attractive—something employees always appreciate.

THE SCOTT WASHROOM ADVISORY SERVICE

On request, a thorough survey of your washrooms will be made by the Scott Washroom Advisory Service. It may be able to suggest improvements in hygiene, comfort and efficiency.

If you provide ScotTissue Towels, it will help you prevent

their waste, so that other companies can share the supply. For instance, we will provide colorful and effective educational material showing employees that *one* ScotTissue Towel will do a thorough job of drying the hands.

Actually, a single "Soft-Tuff" ScotTissue Towel will absorb twice the water left on hands. And it has ten times more rub strength than previous ScotTissue Towels, though soft as ever.

Our *Health Is Ammunition, Too* portfolio contains numerous proven aids for setting up a sound health program. It will be sent to you on request.

Scott Paper Co., Chester, Pa.

SCOTTISSUE TOWELS
STAY TOUGH WHEN WET

Traveling Crane Troubles and Their Causes

1. Pushbutton does not energize main line contactors

Main power line has failed
Control circuit fuse is blown
Main line contactor coil is open-circuited or shorted
Disconnect switch has poor contacts or is open
Main line connectors do not have proper contacts
Loose or broken wiring connections
Pushbutton contacts are burned or corroded
Overload relay contacts have poor contact
Controllers having neutral interlock are not on Off position

2. Bridge does not move when bridge control handle is manipulated

Bridge contactor coils may be burned out (if full or semi-magnetic control is used)
Controller segments and fingers are not making proper contact
Resistance grids are broken
Resistance leads are open-circuited
Bridge-span collectors do not have proper contact (only if cage is attached to trolley)
Resistance bank assembly is loose
Main line contactor might have opened and needs to be reset
Power or control circuit connections are broken
Bridge motor fuse is blown or making poor contact
Bridge motor brushes are sticking and not making contact with commutator
Soldered connections are poor
Solenoid coil is not releasing brake when power is applied (used only on outdoor-type crane)

3. Bridge jumps when starting

Controller contacts are not making proper contact
Some controller contacts have loose connections
Resistance is shorted, connections are loose, or grids are broken
Bridge motor (d.c.) circuit is grounded
Runway has greasy or icy spots
Brake is not releasing

4. Hook does not lower when hoist controller is manipulated

Hoist motor brake is not releasing
Controller fingers need adjusting
Reversing contactor is not closing properly, due to defective contact points or short or open circuit in contactor coil (on magnetic or semi-magnetic control only)
Collector shoes on bridge-span wires are not adjusted for good contact
Hoist motor brake coil is shorted or open
Resistance grids have loose connections
Resistance bank assembly is loose
Hoist motor burned out, due to short-circuit in the armature or field winding
Connections in power or control circuit are broken
Line contactor has opened and needs to be reset
Hoist fuse is blown or has loose contact
Overload relay contacts make poor contact, preventing main line contactor from closing
Circuit not wired properly

5. Hoist does not raise hook on first point of controller

Hoist motor brake is not releasing
Controller fingers require adjusting
Reversing contactor is not closing properly, due to defective contact points or short or open circuit in contactor coil (on magnetic or semi-magnetic control only)
Collector shoes on bridge-span wires are not adjusted for good contact
Hoist motor brake coil is shorted or open
Resistance grids have loose connections
Resistance bank assembly is loose
Limit switch is open
Hoist motor is burned out, due to short circuit in the armature or field winding
Connections in power or control circuit are broken
Hoist fuse is blown or has loose contact
Overload relay contacts have poor contact, preventing main line contactors from closing.

There will be more data sheets on "Traveling Crane Troubles and their Causes" in the June issue.

Prepared by Harnischfeger Corporation, Milwaukee

THERMEX HIGH FREQUENCY HEATING FOR BONDING OR HEAT PROCESSING NON-CONDUCTING MATERIALS MAY BE THE ANSWER

Submit your problem to Girdler Application Engineering Service

Thermex will supply the *heat* and Girdler engineers will supply the *know how* (based on experience) that will help you make the best utilization of Thermex high frequency heating equipment for non-conducting materials.

The number of production operations to which Thermex high frequency heating may be applied are limitless. You may have some jobs that can be done *better, quicker and perhaps cheaper* by Thermex.

Let us study them with you. We suggest that you submit samples of your product and describe your heating problem. Girdler high frequency application engineers will make thorough tests and send you a report for comparison with your present method. We will welcome your inquiry, no matter how difficult your heat processing operation may be. There is no obligation.

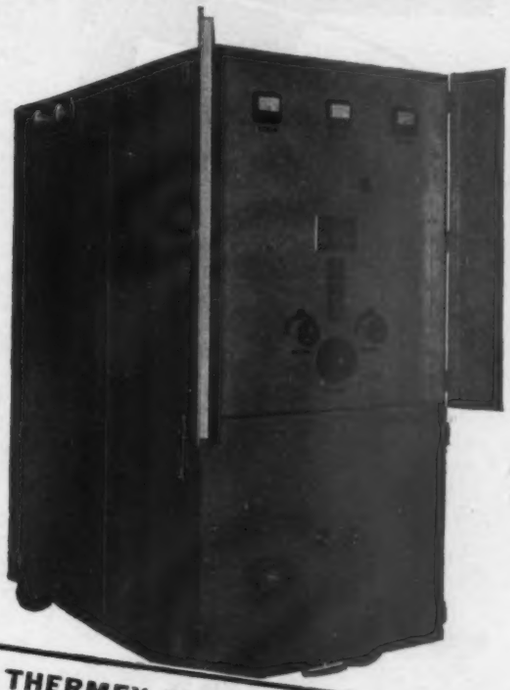
The No. 15 Thermex illustrated at the right is one of several standard units available. The simplified diagram illustrates how practically any non-conducting material can be heated by means of top and bottom or center electrodes.

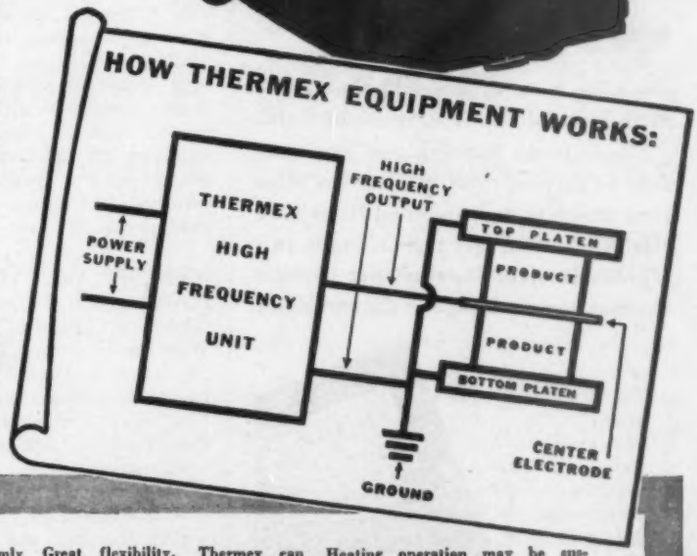
●

Write for illustrated Thermex booklet describing many phases of high frequency, electrostatic heating.

The GIRDLER CORPORATION

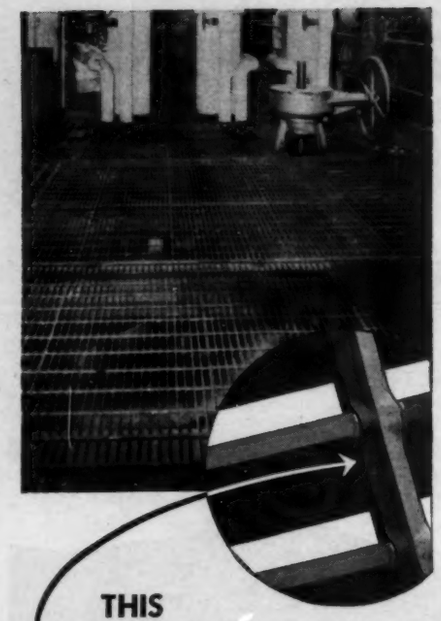
Thermex Division **Louisville, Kentucky**





OUTSTANDING THERMEX ADVANTAGES

The product is heated uniformly *throughout* the entire mass.
Heat is transferred at a *speed* never before attained.
Practically all known non-metallic materials may be heated in a high frequency electrostatic field.
Absolutely *uniform* heating means *improved* quality of product.
No over curing or under curing.
Great flexibility. Thermex can handle a wide variety of jobs with high overall efficiency.
Results may be reproduced *without variation*. Temperature is accurately controlled at all times.
Chemical contamination is completely avoided.
Induced heat may be used to bring about chemical reaction.
Heating operation may be suspended instantly, thus the danger of damage from overheating is avoided.
No "hot plates" or steam. High frequency supplies heat direct to and thruout the product. No scorching or surface damage.
Wide range of sizes for *all* requirements.



THIS
SCRAPER TREAD OF
BATES-GRATES
OPEN STEEL FLOORING
GIVES THE
COMBINATION OF SAFETY AND CLEANLINESS
YOU WANT IN OPEN STEEL FLOORING

This extra cleanliness and safety come with the use of welding technique that, for years, has been recognized as the correct method to follow—a simple fillet weld.

There is no burning and no overflow of surplus metal around the fillet into which is press-welded Bates Hex Bar Stock. You get top strength and rigidity in steel flooring that permits the maximum passage of air and light.

Write for the new catalog "FILLET WELD BATES - GRATES" that gives complete details—well illustrated to show how advantages of this open steel flooring can be used in your plant.

WALTER BATES COMPANY, INC.
JOLIET, ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

YOU WANT TO KNOW

more about the items mentioned on this page

Letters to the addresses given will bring information

• IT'S A STORY IN ITSELF how the Employees' Suggestion Conference of United Air Lines Transport Corp., 5959 S. Cicero Ave., Chicago, functions. A booklet in picture form has been put out by United to illustrate the routine through which each and every employee suggestion must go, regardless of how minor it might be. Policy and procedure of conducting the Suggestion Conference is outlined step by step, from thought stimulators to final awards.

• THREE NEW SOUND SLIDE FILMS are being offered by "the visual education people," R. M. McFarland & Associates, 520 N. Michigan Ave., Chicago. One is a 15-min. film on "Absenteeism." The other two, "Defense for Children of Mothers Working in War Industry" and "Safely Yours," for women in war industry, take 20 minutes' showing time. A manual, containing additional information on each subject and explaining the most effective way to show the film, is supplied.

• WIRE REINFORCED V-BELTS are announced by B. F. Goodrich Co., Akron, Ohio. Two types are being built, a cable cord construction and a grommet construction that incorporates a wire cord placed in the center of a cotton or rayon grommet.

• THEY SAY IT'S TOTALLY DIFFERENT as a finish for metal. Called Armor-Vit, it is a coating which is applied by spraying or dipping and cured at a temperature of 750 to 800 degrees Fahrenheit. According to the manufacturer, the finish is resistant to chemicals such as caustic soda, alcohol, and acids; withstands impact and abrasion; resists thermal shock; protects metals against rust and corrosion. Chicago Vitreous Enamel Product Co., Cicero, Ill.

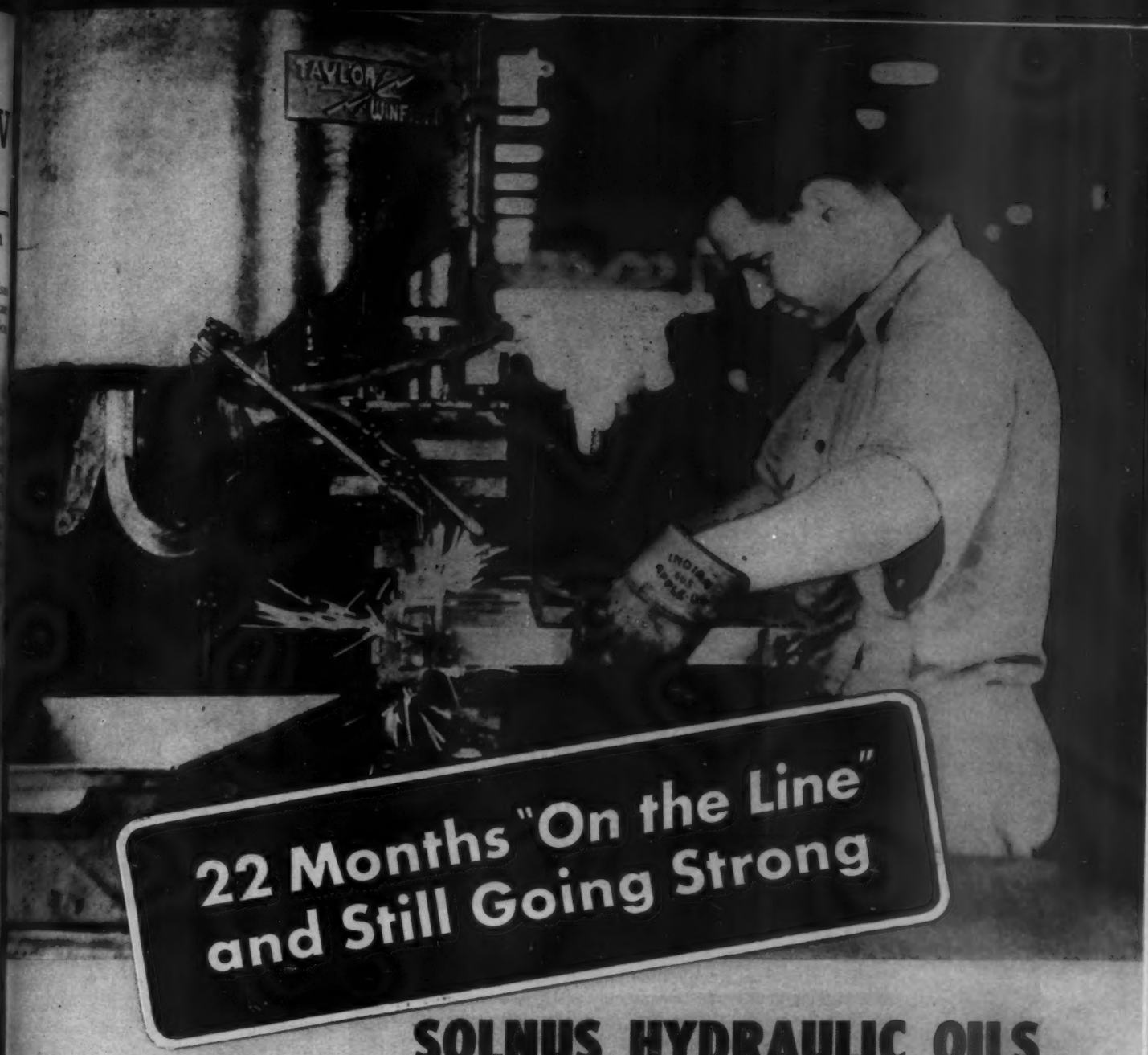
• THESE ARE YOUR WEAPONS. Booklet giving 14 ways to increase war production tells us "There is 'One Best Way' to do every job." Outlined are 14 "Laws of Work" applicable to every job. Plomb Tool Co., Los Angeles, shows how more work can be produced with less fatigue by sticking to these 14 simple work rules. The questionnaire form of the booklet gives each reader a chance to rate himself on "Am I doing my job in the one best way?"

• ABSENTEE AL and CARELESS CHARLIE, those boys who are slowing up our war effort, have made the comics. Going on the basis that everybody likes to read the funnies, Morale Building and Absentee Reduction Service, division of The Parents' Institute, Inc., 52 Vanderbilt Ave., New York, has published a series of booklets that tell in full-color comic form how lost time from absenteeism and carelessness counts up. Booklets are available at low cost for loose distribution or for binding into a house organ.

• HOW TO OPERATE A CRANE, a helpful little booklet giving some of the essential "do's" in operating a crane safely and to its fullest capacity. Standard crane hand signals, definitions, hoisting hints, trolley tips, bridge cues, lifting magnet aids, maintenance instructions, and safety rules are some of the subjects discussed. Photographs and diagrams illustrate the text, showing clearly what to do and what not to do. Supplied by the Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, at 25c a copy.

TURBAN FOR WOMEN WELDERS protects the hair, ears, and back of neck from flying welding sparks. Of one-piece construction, it fastens with snaps. Styled by John Frederics, noted hat designer, the turban can be had in chrome tanned leather or fire-resisting cloth, and is for comfortable wear with or without welding helmet. American Optical Co., Southbridge, Mass.

• TO AID WARTIME STEEL USERS, a revised standard steel analysis chart for quick reference has been published by American Steel & Wire Co., Rockefeller Bldg., Cleveland. A helpful feature is the breakdown which shows whether or not various types of products are available in specific analyses and the listing of varying amounts of component elements used in producing various grades of steel. The chart covers carbon and free-cutting steels, manganese, nickel, nickel



22 Months "On the Line" and Still Going Strong

SOLNUS HYDRAULIC OILS

Stay On The Job After 12,318 Hours of Continuous Service

A large wire products manufacturer, now engaged in vital war work, operates four hydraulic press welders. Almost two years ago these welders, each with a capacity of 30 gallons, were filled with SOLNUS HYDRAULIC OIL.

After 12,318 hours of continuous operation, without the slightest trouble of any kind, a sample of the oil was taken from each welder and subjected to careful laboratory tests. These tests showed no appreciable change in flash, fire, viscosity or acidity of the oils and indicated that they were in suitable condition for long, continued use.

This is just one more example of the way in which SOLNUS HYDRAULIC OILS are helping to keep war plants on round-the-clock production schedules . . . by abolishing frequent time-consuming and costly shutdowns for cleaning and oil changes.

If sludge-clogged oil lines, faulty pressure or frequent oil changes are throwing your production schedules off balance, it will pay you to call in a SUN "Doctor of Industry." Let him show you how SOLNUS HYDRAULIC OILS can give you the kind of service you need to keep your hydraulic equipment in continuous service and save money. Write

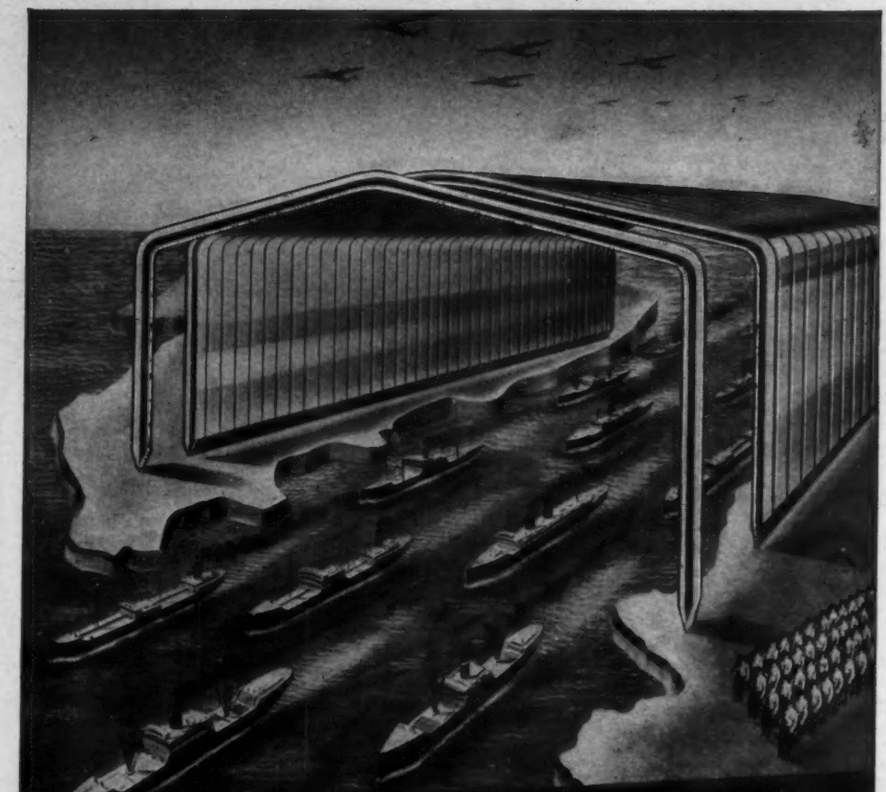
SUN OIL COMPANY • *Philadelphia*

Sun Oil Company, Limited, Toronto, Canada

SUN PETROLEUM PRODUCTS

SUNOCO

HELPING INDUSTRY HELP AMERICA



What's This Little Bostitch Staple Doing on Convoy "X"?

THE CARGO bristles with Bostitching (machine-applied stapling) drafted for the war... for SPEED!

Speed in shaping ammunition belts for our soldiers to feed their guns... in assembling plastic scabbards for their bayonets... in steel-stitching parts for planes and tanks they will ride... in linking portable landing fields and emergency roadways... in the equipment that protects their ships against magnetic mines... in hundreds of other applications newly created for war purposes... in thousands of applications regularly used on civilian products but now enrolled in war service!

These wartime uses are further evidences that "Bostitch fastens it better, and faster, with wire." Meeting war production challenges is also creating new and improved Bostitch tools and applications for future use... nearly 800 Bostitch models and types make possible the right combination of machine and staples for each particular job.

If you have the necessary priorities, find out *now* if Bostitching can help speed your production... if priorities are not available, investigate Bostitching *now* so that you can apply these advantages and improvements immediately to quick post-war adjustments and production.

Bostitch, (Boston Wire Stitcher Company) 74 Blackmore Street, East Greenwich, R. I. (Bostitch-Canada, Ltd., Montreal).

BOSTITCH

fastens it better, AND FASTER with wire

ALL TYPES OF STAPLES APPLIED BY MACHINES
ALL TYPES OF MACHINES FOR APPLYING STAPLES

MOTORIZED STAPLER 1 of the 800

chromium, and molybdenum steels, al chromium, chromium vanadium, silic manganese, and National Emergen steels. Copies are obtained by writi on company letterhead to the Americ Steel advertising department.

• AMMONIA SUBSTITUTE FO CLEANING has been developed in Co Solv, a non-inflammable, non-explosi dirt-chaser which has a fresh pine od Product of the Cole Laboratories, 22-1 37th Ave., Long Island City, L. I., t cleaner is nationally distributed.

• NYLON WINDOW SCREENS a looming on the post-war horizon. Th can be produced in any color desi and will require no painting. The mak claims that weather will not corrode the and they won't stain sills. Bumps on t screen won't leave bulges, and pencils other sharp objects can be shoved throu without damage. To eliminate takin screens down each fall, the nylon scre will roll up and down on tracks like window shade. E. I. DuPont de Nemou & Co., Inc., Wilmington, Del.

AUTOGRAPHIC REGISTER for handling written systems of control is made of non-critical laminated plywood and hardwood working parts. Up to eight legible copies at one writing are claimed possible. Feed control is positive. Developed by Standard Register Co., Dayton, Ohio

• TO SPREAD THE GOSPEL of good nutrition General Electric Consumers Institute, Bridgeport, Conn., offers the Master Nutrition Guide. Designed for industrial dietitians, the manual outlines a 3- to 4-week course to get the story of better nutrition across to factory and home. Free to instructors. Extra copies at cost.

• ABSENTEE RECORDER provides the mechanics for a good-humored competitive game between departments to reduce avoidable absenteeism. Constructed with a wood frame and wallboard backing, the recorder has a pictorial appeal to the worker to keep punching—it means a poke right in der Fuehrer's eye. A center panel of removable slides records the weekly percentage of avoidable absenteeism of each department. There's room for as many as 22 department records. Regent Specialties, Inc., 266 Lyell Ave., Rochester, N. Y.

YOU CAN BE SURE

YOUR WAR PLANT LIGHTING WILL NOT FAIL

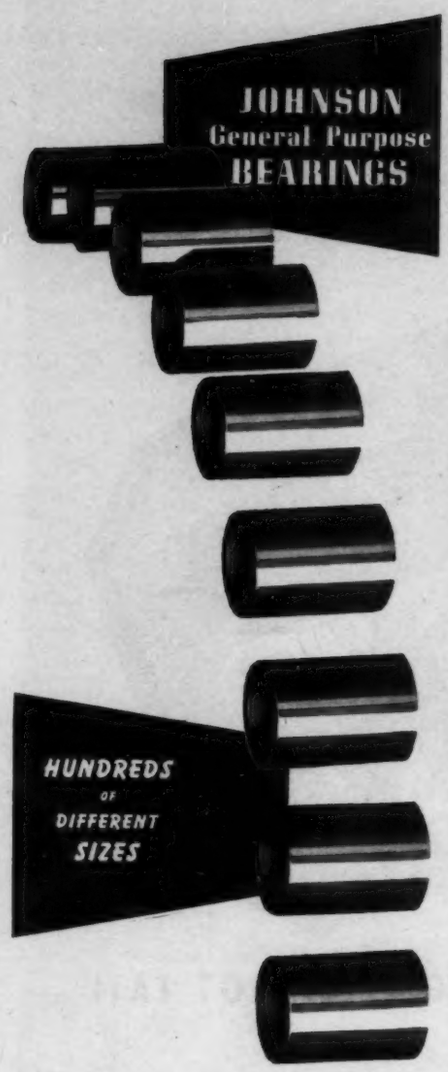
Continuous operating schedules—vital to uninterrupted war production—intensify the need for industrial lighting equipment that assures efficient, economical lighting under all conditions. Proper lighting speeds seeing, reduces accidents and spoilage, helps workers sustain production speed and production quality.

This is no time to experiment with unknown, untried, unproven products. It is a simple matter to eliminate all risks of lighting failures. Insist on industrial lighting fixtures built to RLM Specifications . . . certified by the RLM LABEL. Industrial Lighting Fixtures made in accordance with RLM Specifications are designed and constructed with that extra safety factor vital war plants should demand of their lighting equipment. They assure highest lighting efficiency, maximum power conservation, lowest maintenance costs and greatest protection against lighting equipment failures. These porcelain enamel reflectors are unaffected by mechanical strains, smoke fumes, grime, dust and atmospheric conditions . . . are non-porous, easily cleaned, fadeproof, non-peeling and non-breakable. For full particulars write any manufacturer of RLM Industrial Lighting Units, or RLM Standards Institute.

The RLM Label Has Stood as a sign of Quality in Industrial Lighting Reflectors for More Than 20 Years!

The Letters RLM Stand for Reflector and Lighting Equipment Manufacturers

RLM STANDARDS INSTITUTE
INCORPORATED
307 N. MICHIGAN AVE. · SUITE 1600 · CHICAGO, ILL.



Machine Finished

Save time . . . avoid trouble in securing plain bronze bearings . . . by Specifying JOHNSON General Purpose. Every bearing is machine finished ready for assembly. They last longer . . . operate more efficiently. Over 800 sizes to choose from . . . twenty warehouses to serve you. Write for new catalogue . . . today.

JOHNSON BRONZE CO.

Sleeve Bearing Headquarters

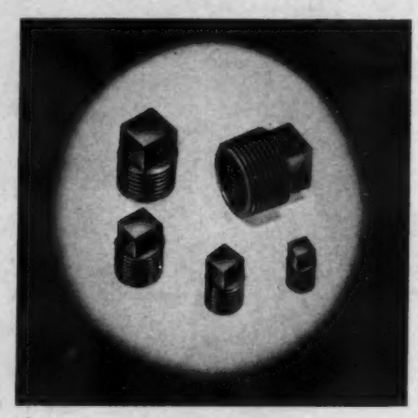
512 S. MILL ST., NEW CASTLE, PA.

Specify JOHNSON BRONZE

WHAT'S NEW IN EQUIPMENT

Plastic Pipe Seal Plugs

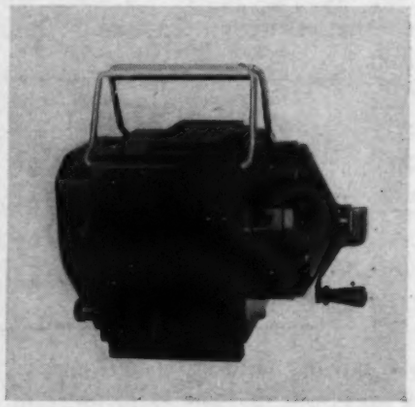
These light, tough, non-corrosive plastic seals protect threads against damage, moisture, dirt, weathering, and rust, according



to the manufacturer. Precision molded in $\frac{3}{8}$-, $\frac{1}{2}$-, $\frac{3}{8}$-, $\frac{3}{4}$-, and 1-in. sizes. Other sizes can be supplied on application. American Molded Products Co., 1644 N. Honore St., Chicago.

Insulation Resistance Tester

For the first time "Made in the U.S.A." applies to Meggers. These instruments now appear in molded plastic cases, have direct reading ohmmeter, and hand-cranked



generator. Joints in case are dustproof and splash-resistant, it is claimed. Unit is available in variable- and constant-pressure types. Weight and size vary slightly with type, the maximum weight being 8 pounds. James G. Biddle Co., 1211–13 Arch St., Philadelphia.

Stripping Medium

S-159 stripper is said to provide quick, easy removal of insulating varnish from electrical equipment, and eliminate scrapping of splashed parts which should be varnish-free. Prior to varnishing, S-159, a blue, viscous liquid, is brushed on surfaces that are to be kept clean. When the varnish treatments are finished, portions adhering to parts treated with stripper are claimed to be easily removed with a wood or bakelite knife without marring close tolerances. Sterling Varnish Co., 130 Ohio River Blvd., Haysville, Pa.

Scoop Attachment

Shovel-type scoop that can be interchanged with standard forks in picking up, carrying, and dumping all types of loose bulk materials has been developed for use with standard Towmotor lift truck models. Manually controlled, the scoop can pick up or dump materials at any

point within the lift range. Is reset to digging or carrying position after dumping by lowering to floor level until spring-operated catches automatically take hold. An anti-spiller device that fits over the front lip of the scoop is an optional feature. Scoop is available in capacities from 8 to 25 cubic feet. Towmotor Corp., Cleveland.

Lightweight Thyratron Tube

Designed for applications where weight and space must be considered, a thyratron tube with a control and a shield grid for control applications has been announced. Designated as the GL-502, the tube is a little over 2¼ inches long, weighs about 2 ounces, is inert-gas filled, and of all-metal construction. Applications for the tube are in industrial welding and any general control equipment. Control characteristic is practically independent of ambient temperature over a wide range, it is claimed. The thyratron has high-sensitivity characteristics, is relatively unaffected by line voltage surges, has a maximum peak in-

Conserve It With Leather Belting In Modern Group Drives

Power is one of America's most vital war weapons. It is the duty of every manufacturer to make the most efficient use of it . . . to waste none. Leather Belting, applied to Modern Group Drives, has proved its ability to conserve power. At the same time it makes possible the highest rate of production from any group of machines.

In actual cases where Modern Group Drives with Leather Belting have replaced individual motor drives, the following results have been recorded:

- **drive efficiency has been raised 4 to 11%**
- **power factor has been increased 6 to 26%**
- **connected hp. has been reduced 11 to 45%**

Leather Belting in Modern Group Drives also saves large quantities of copper and steel, conserves manpower, reduces shutdowns and cuts maintenance. Your Leather Belting supplier will give you the complete facts. Also be sure to ask him for your copy of the booklet "How To Get The Most From Your Leather Belting." If you prefer, write direct to

AMERICAN LEATHER BELTING ASSOCIATION **53 Park Row, New York, N. Y.**

Rely on Leather Belting

THE *Strategy* OF MAN-POWER

RELIEVING VITAL MAN-POWER of unnecessary fatigue . . . avoiding unnecessary handling . . . saving unnecessary steps . . . keeping a constant flow of material moving to waiting hands and machines, that's man-power strategy headed towards victory.

America's war industries from coast to coast are improving their per-man-and-machine-hour production schedules with the aid of Mathews Time-Coordinated Conveyer Systems.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

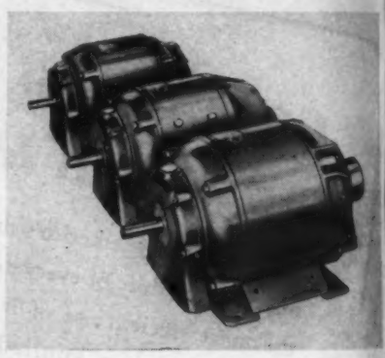
If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

verse anode voltage rating of 1300 volts, instantaneous current rating of 500 milliamperes, and an average current rating of 100 milliamperes. The cathode is quick-heating and is rated at 6.3 volts, 0.6 ampere. Electronics Dept., General Electric Co., Schenectady.

Motors

Line of motors in which all types in any one frame size are interchangeable are offered in Uni-Shell motors. Built within cylindrical shells, only the end heads are different on the various types of motors. All other dimensions, from shell measurements to shaft-head fit, are identical for



all types in any one frame size. This line covers polyphase induction motors, capacitor start induction motors, standard d.c. motors and generators, repulsion induction motors, and other types. Double-row-width ball bearing is standard on ball-bearing motors. Three grades of rotor balance, static, commercial dynamic, and special dynamic, are available. Robbins & Myers, Inc., Springfield, Ohio.

Protective Products

Welding curtains of flameproof, waterproof canvas or asbestos, canvas salvage covers, and asbestos fire blankets have been added to the safety equipment line. Welding curtains are deep-hemmed on all four sides and seams are double-stitched, corners reinforced. Eyelets permit hook or cord suspension. Salvage covers for protecting equipment from

PLAN YOUR DISTRIBUTION SYSTEM

FOR *Quick Conversion*

Future demands on your plant depend on events no man can accurately foretell. Sound practice today calls for farsighted planning—to insure the ability to make quick production shifts economically.

Such shifts depend to a large extent on your plant distribution system. For on it hinges the ability to meet quickly changes in the nature, location and density of loads.

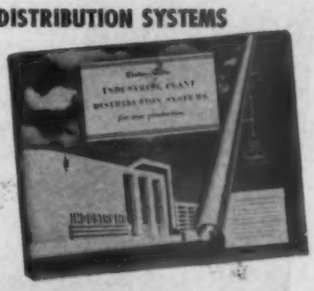
That's why we say *plan now for maximum flexibility in your plant distribution system*—to give increased efficiency and sabotage protection today, to facilitate speedy and economical conversion tomorrow.

Westinghouse has designed and built hundreds of distribution systems for all types of plants. Thus our engineers are in a position to recommend the "one best" distribution system for your plant—the system that provides maximum flexibility with the least use of critical materials.

To bring this broad engineering experience to bear on your particular problem, call our local office. Or send for the helpful booklet below. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania. J-94562

UP-TO-DATE FACTS ABOUT DISTRIBUTION SYSTEMS

Keep up-to-date on latest plant distribution systems. Send for 24-page Booklet, B-3152, which briefly describes different plant distribution systems, and points out the advantages of each.



Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

PLANT DISTRIBUTION SYSTEMS

FASTER DRYING and BAKING with KIRK & BLUM Industrial OVENS

. . . SAVE FUEL . . . REDUCE PRODUCTION COSTS

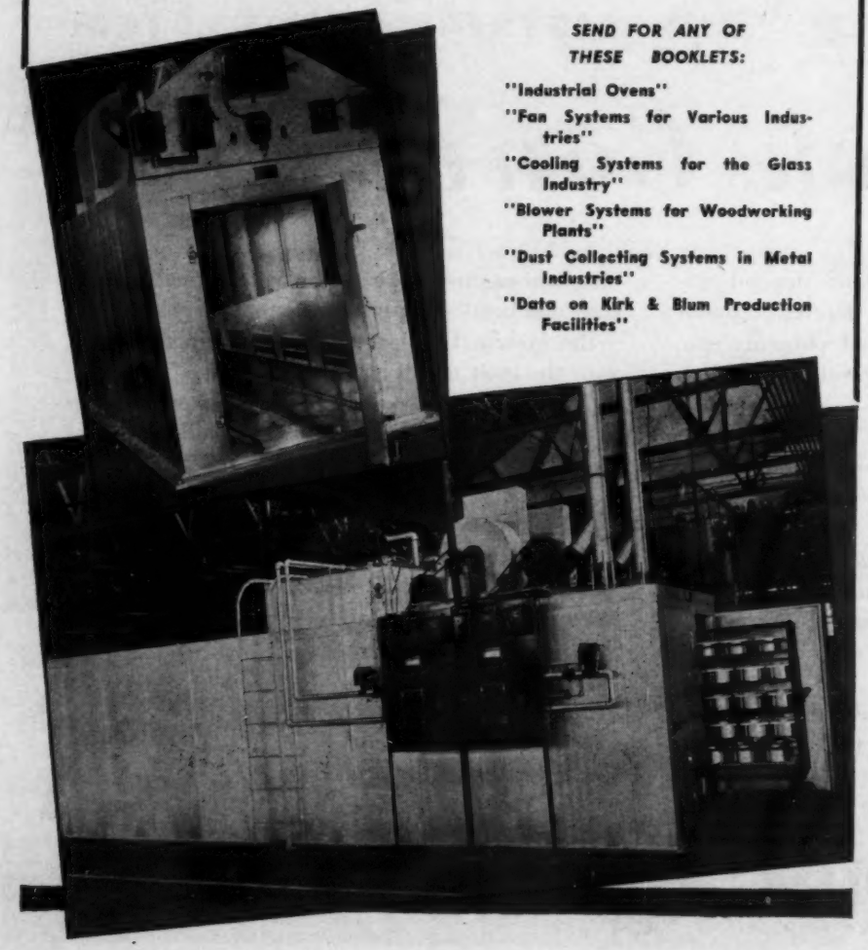
Get safe, dependable and efficient operation and improved finishes on products.

For over 36 years Kirk & Blum Engineers have been designing and installing industrial ovens for a long list of diversified industries.

With this background and extensive engineering data, Kirk & Blum Engineers are enabled to analyze your oven problems quickly. They will submit unbiased recommendations and specifications on the particular type and design most adaptable to your special needs.

If you have a drying, baking or enameling problem, consult Kirk & Blum today. There's no obligation. Join the ranks of many leading manufacturers who recognize Kirk & Blum engineering leadership as their guide to uniformly high quality standards of oven performance.

THE KIRK & BLUM MANUFACTURING CO.
AN ORGANIZATION OF ENGINEERS AND MECHANICS
2835 SPRING GROVE AVE. CINCINNATI, OHIO



SEND FOR ANY OF THESE BOOKLETS:

"Industrial Ovens"
"Fan Systems for Various Industries"
"Cooling Systems for the Glass Industry"
"Blower Systems for Woodworking Plants"
"Dust Collecting Systems in Metal Industries"
"Data on Kirk & Blum Production Facilities"

water, dust, and snow are also made of flameproof canvas. Fire blankets, for extinguishing small fires, are provided with two eyelets in each corner for attaching rope hand-holds. All three products are made to specifications, and additional eyelets may be placed where desired. Industrial Products Co., 2820 N. Fourth St., Philadelphia.

Emergency Lighting Unit

Requiring no fixtures or wiring other than plug-in connections to the a.c. supply, Lightguard emergency lighting unit meets the need for a source of emergency light. It throws a beam of light 50 feet wide a distance of 150 to 200 feet, covering an area of 7400 square feet. When the lights go out, the Lightguard, by automatically switching on a broad beam of

light, helps to reduce the accident hazard. Because it is a self-contained unit weighing only 47 pounds, it can be moved from its customary position during a fire, accident, explosion, or air raid. Unit operates instantly and automatically without a hand touching a switch. The only maintenance required is the occasional adding of water. Recharging is done automatically by trickle charge. State of charge is indicated by pilot balls. Illumination is provided by a sealed glass, pre-focused auxiliary driving lamp. Supplied with a 3-cell storage battery assembled in a glass jar. The Electric Storage Battery Co., 19th St. & Allegheny Ave., Philadelphia.

Tubing

Uniformity is claimed for strip steel welded tubing in wall thickness, diameters, and physical properties. Made in accordance with government, ASME, and ASTM specifications, it meets the demands for boiler, condenser, heat exchanger, and mechanical applications. Scale-free finish is claimed. Electroweld Steel Corp., Oil City, Pa.

Cargo Truck

Adaptable for handling bulky equipment and heavy materials, this cargo truck can be used as a single hand truck or as a tractor trailer, and is equipped with coupling and ring-grip handle for hitching

LET'S WIN THIS BATTLE, TOO!

"*Hand tools are taking a terrific beating* in the war factories. WPB estimates that because of improper use, the life of 75% of such implements is greatly reduced. Wear and tear appears to be greater on second and third shifts made up of less experienced workers."

—NEWSWEEK

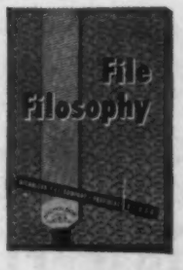
AMERICA! . . . Where ships are built in a fortnight! Where planes, guns and machines are produced by the thousands! Where manufacturing efficiencies are the wonder of the industrial world!

It is not at all like the American way to permit wastes like those reported in NEWSWEEK. Even under the stress of war production, tool misuse and abuse can be greatly lessened—*through education.* The millions of filing operations which take place daily in factories, machine shops and other industrial plants represent a wide field for teaching, training and savings.

Toward aiding manpower—conserving materials—making files do more work and last longer—

THIS NEW BOOK WILL HELP

"File Filosophy," by Nicholson, is recently off the press. Send for it. It's FREE—48 instructive, profusely illustrated pages on files—their *many kinds, correct use, proper care* and how to select *The right file for the job.* "File Filosophy" will prove helpful to both men and managements. Enables production heads and foremen to pass valuable information along to workers eager to learn and ready to do their part in the war we *must* win.



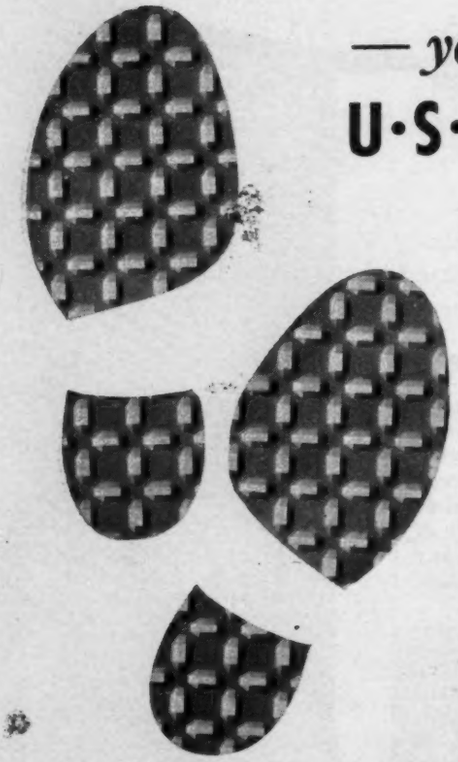
NICHOLSON FILE CO.
27 Acorn Street
PROVIDENCE, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES
FOR EVERY PURPOSE

"DON'T FALL DOWN ON THE JOB"

— *you won't with*

U·S·S MULTIGRIP



More than 60 little Multigrip cleats gear the foot to the floor assuring safe, sure traction.

LOST time accidents are taking a serious toll of war production . . . and falls rank near the top as contributing causes.

Absenteeism for this and other reasons is becoming a matter of national importance. Something must be done.

One step in the right direction is to hunt out all danger spots in your plant and install U·S·S Multigrip Floor Plate. Multigrip assures safe footing in machine shops, power plants, runways, loading platforms and dozens of other dangerous spots.

Multigrip is easy to clean, drains quickly, gives traction in any direction.

On trucks, tanks, ships, gun platforms it gives sure footing for fast action in wet or dry weather.

U·S·S MULTIGRIP FLOOR PLATE

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

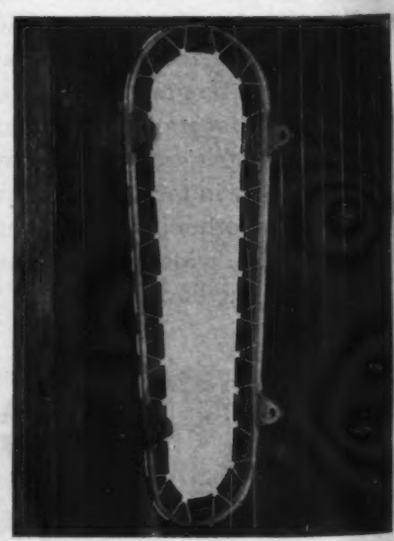
two or more trucks in a train. Turns within a radius of its own length; 320-deg. turning being claimed for the large cast steel fifth wheel which reinforces the length of the axle and forms sockets for the drawbar. Wheels are equipped with roller bearings and wide crowned rims for solid rubber tires. Projections, bolts, and cotter keys have been eliminated from the loading surface which is 32x72 inches. Weight is 481 pounds with rubber wheels, 517 pounds with all-metal wheels. Madsen Iron Works, Ltd., 5631 Bicket St., Huntington Park, Calif.

Air Conditioning Unit

Air conditioning unit for removing water, oil, and dirt from compressed-air lines has been announced. The unit is constructed of non-corrosive metal throughout, and filtration is mechanical, with no moving parts. No cotton, felt, or fibrous filtering element is employed. Can be supplied with water drain which automatically discharges water as it accumulates. Air regulator is said to insure precise regulation of working air pressures. Supplied in 6-, 12-, 24-, 48-, and 96-cu.-ft. sizes, and with one to three outlets. Paasche Airbrush Co., 1909 Diversey Parkway, Chicago.

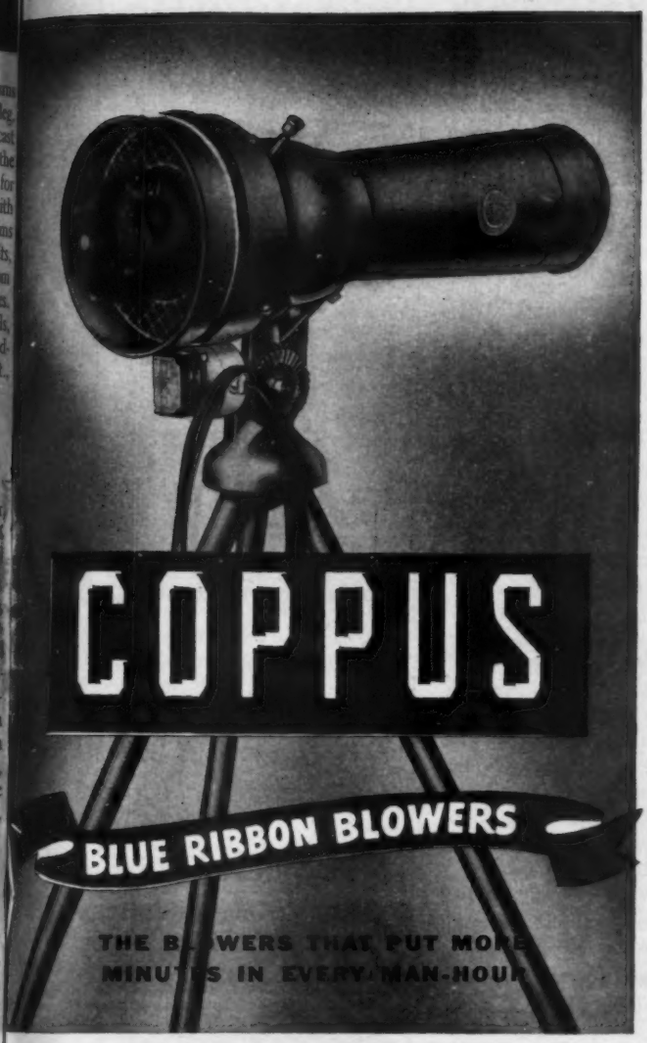
Stretcher

Made of selected ash and cotton duck, the Stretcher-Kot is lightweight and easy to handle—two empty ones can be carried in each hand. The continuous rail allows the unit to be picked up from any posi-



New Strength through Air

WORKERS HAVE MORE WAR PRODUCTION "DRIVE" WITH A COPPUS BLOWER OR HEAT KILLER NEARBY



Thousands of cases prove that a man can do more work where it's cool and comfortable than where heat and bad air are continually sapping his energy.

In these cases, Coppus "Blue Ribbon" Blowers and Exhausters have earned their salt, bringing renewed energy, skill and morale to men working near furnaces . . . in tanks . . . in underground cable manholes . . . around hot processes.

Portable, adaptable for special purposes, each one built with Coppus "Blue Ribbon" precision and strength, they are putting more working minutes into every war-essential man-hour—more and better production every day!

CABLE MANHOLE AND TANK VENTILATORS — BOILER MANHOLE BLOWERS AND EXHAUSTERS — HEAT KILLERS — SHIPHOLD VENTILATORS . . . DESIGNED FOR YOUR INDUSTRY — ENGINEERED FOR YOU

MAIL THIS COUPON To Coppus Engineering Corp., 205 Park Avenue, Worcester, Mass. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in SWEET'S CATALOG.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets, etc., after treated with coating material.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....

(Write here any special ventilating problem you may have.)

FIND YOUR MAN FASTER!

VITAL WAR PRODUCTION CAN'T WAIT!

"Cartwright, there must be some quicker way to locate Jones!"

IT isn't a Northwest "Mountie" that "always gets his man" in one of America's largest aircraft plants! It's Operadio *voice*-paging—the *quickest* way to "locate Jones," give orders, get facts, speed vital war work!

Records show that 650 individuals were located during the plant's first 8 hours of voice-paging operation! And 95% of the paging calls were answered within 60 seconds!

How fast do *you* locate key-men "somewhere in the plant"? The total of minutes wasted may represent an appalling time-loss! One factory credits voice-paging with a saving of 4,000 man-hours per month!

And it's not only *voice* that works for you! Your Operadio installation can give plant-protection alarm and time signals —stimulate production by means of music scientifically selected for fatigue relief—help speed vital war materials to the men who need them!

Without blare or distortion, Operadio sound leaps to any room or area, adjusts to any noise-level. Operadio systems are doing essential jobs at Wright Aeronautical Corp., Washington National Airport, U. S. Navy Yards and Training Stations, war plants everywhere.

, symbol of electronic excellence, has identified Operadio products through 25 years of electronic research.

WRITE OR WIRE TODAY for *free folio* showing how Operadio can speed *your* production, help get material to the fighting front faster!

Address *Operadio Manufacturing Co., (Dept. F-2), St. Charles, Illinois.*

OPERADIO

Voice Paging

MUSIC AND PUBLIC ADDRESS • TIME SIGNAL AND ALARM

BY THE MAKERS OF "FLEXIFONE" INTERCOMMUNICATION

Licensed under U. S. Patents of American Telephone & Telegraph Co. and Western Electric Co., Incorporated

tion as a stretcher. The specially co structed 8-in. high legs turn it into a when it is placed on the floor. Stretch Kots can be hung on the wall or sto in nests of two or three. The fab piece is removable for laundering or replacement with "spares." J. L. Sch ing Sales Co., 16 E. 40th St., New Yo

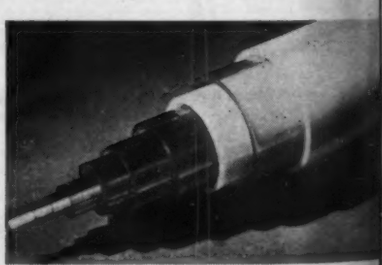
Machine-Lighting Units

Directive lighting units for machine lig ing are added to the Swivelier line. Th units are not affected by machine vi tion; stay put at any angle—both soc

and base are adjustable; have no setscre or wingnuts; and are available in a choi of arm-lengths. The wiring is complete inclosed in the unit. A choice of bas and socket combinations is offered, an three types of shades are available. Re liance Devices Co., Inc., 510 6th Ave New York.

Plastic Tubing

Seamless plastic tubing, called Tulox TT is available in all diameters up to 2 inches outside diameter. The range is being



increased to 2½ inches outside diameter Tubing is extruded from Tennessee East man Cellulose acetate butyrate. Extruded Plastics, Inc., Norwalk, Conn.

Switch

To prevent operation of double-throw disconnects from one position to the other, without coming to a full stop i the open position, a positive lock is lo cated at the switch blade hinge end. Th lock stops the blade in mid-position so

HOLD 'EM

WHEN AND WHERE YOU WANT 'EM

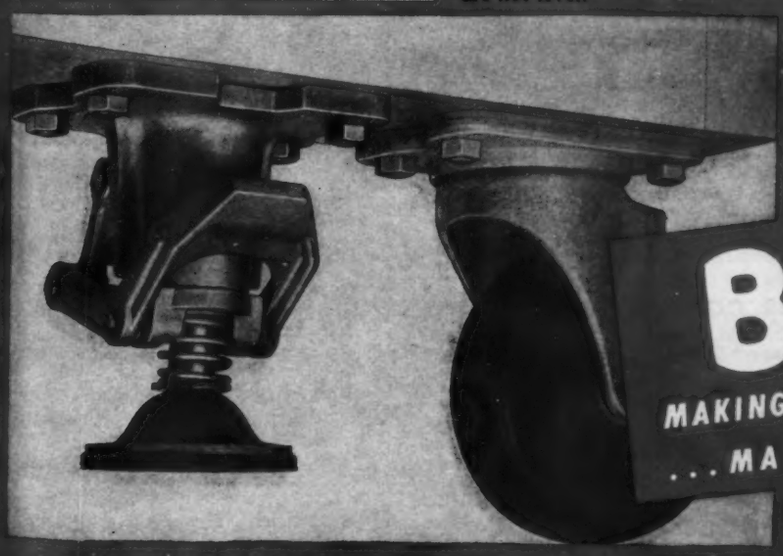
Bassick Position Locks Are Easier to Use, Work Better and Cost Less

Bassick's compact, rugged, positive Position Lock is proving to be the most efficient way to keep floor trucks and portable equipment in place without bothering with expensive, troublesome caster brakes.

Another development of Bassick's caster-engineering, the Position Lock shown here, represents only one design and one size of this new product, adaptable to your specific requirements, for floors or grooved for rails, and if your present problem, involving the steadiness and safety of portable equipment in your plant, requires a *special* application, Bassick engineers are ready to work with you. Write the Bassick Company, Bridgeport, Conn.

Always accessible. Wheel brakes are too often far *under* the truck or in a *hard-to-work* position, the Bassick Lock's foot lever is always easy to reach, but still in a protected position and out of the way. An easy downward pressure sets and locks it in place.

Always firm. Almost 12 square inches of friction locking surface in contact with the floor! Compare this with the much smaller point of contact of an average caster wheel brake. Yet only a slight upward pressure of toe or lever releases the lock. A spring and a universal joint assure flat, firm contact even where floors are not level.



Never in the way. The lock, in released position, is off the floor with ample clearance. No intermediate point of drag, no danger of partial releasing.

"Remember! Bassick's is industry's most complete line of Truck Casters and related materials-handling equipment!"

EXAMPLES:

"Floating-Hub Casters"

absorb shocks and eliminate damage to materials in transit.

Super Heavy Duty Precision Casters

will carry any loads that can be moved on a given size of wheel.

Grooved Wheel Casters

For operation on angle floor track — the new, economical method for mobility on production lines.

Bassick

MAKING MORE KINDS OF CASTERS ... MAKING CASTERS DO MORE

THE BASSICK COMPANY
BRIDGEPORT, CONN.
Division of Stewart-Warner Corp., Chicago, Ill.
Canadian Factory: Stewart-Warner-Alemite Corporation of Canada, Ltd., Belleville, Ont.

PROTECT

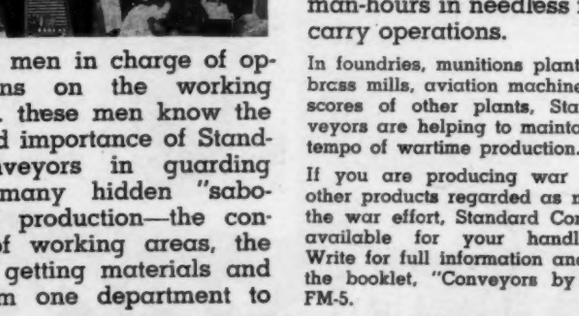
. . . AGAINST HIDDEN SABOTEURS OF PRODUCTION

ASK the men in charge of operations on the working front . . . these men know the value and importance of Standard Conveyors in guarding against many hidden "saboteurs" of production—the congestion of working areas, the delay in getting materials and parts from one department to another—the loss of valuable man-hours in needless fetch-and-carry operations.

In foundries, munitions plants, steel and brass mills, aviation machine shops and scores of other plants, Standard Conveyors are helping to maintain the swift tempo of wartime production.

If you are producing war material or other products regarded as necessary to the war effort, Standard Conveyors are available for your handling needs. Write for full information and a copy of the booklet, "Conveyors by Standard," FM-5.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul, Minn.
Sales and Service in All Principal Cities



★ ENGINEERED FOR FASTER PRODUCTION ★

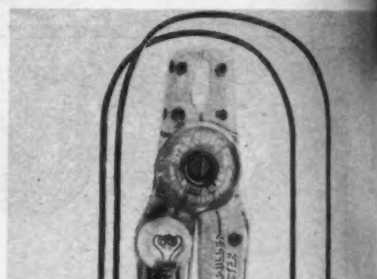
is necessary to place a switch stick in hook rings at hinge to release lock before completing travel to other position. Switches can be furnished in all standard voltage and ampere ratings. Delta-Star Electric Co., 2400 Fulton St., Chicago.

Skin Protector

Skin protector cream, AleXitE formula 1–43, forms a barrier against skin absorption of water, oil, or grease-carried irritants, and guards against fumes, soot, dust, paint, iron oxide, and other skin poisoners. It is claimed a highly effective protection against most types of industrial dermatitis. Safeguards natural skin oils to prevent drying and chapping. AleXitE Engineering Co., Alexander Bldg., Colorado Springs, Colo.

Pocket Test Plier

Pocket plier for testing and removing fuses is made of reinforced transparent plastic and claimed to be insulated throughout. The 10-watt carbon lamp glows through



the plier when lighted in testing. Range of tester is 110 to 250 volts. Grips 10- to 100-amp. fuses. Is 7 inches long, weighs 4 ounces. Star Fuse Co., Inc., 245 Canal St., New York.

Floor Preserver

Flash-Seal floor preserver can be used on concrete, wood, or cork-tile floors. According to the manufacture it penetrates wood, acting as a seal against dirt and

OWI Photo by Palmer, in an Allegheny Ludlum plant.

Save . . TO PRODUCE MORE

The nation needs scrap iron and steel—millions of extra tons of it this year. Make your clean-up complete, both in the plant and at home. Subject every pound of idle metal to the searching question: "Is it absolutely essential that we keep this?"

But don't stop there! Rounding up the scrap and instituting more thorough salvage methods are only part of the job of conserving the nation's resources. Start at the beginning and make better use of *new* steel . . . aim to get more finished products out of it, with less waste.

That is particularly necessary with electric-furnace steels, and the critical alloys they contain. There are many ways to save. Both stainless and tool steels can be more efficiently selected and better used, to step up production and cut down the amount of rejects and spoilage. The substitution of lower alloys, and of standard analyses, sizes or finishes instead of special ones, all offer good opportunities to save.

Right now, do your share to increase the nation's scrap stockpile. And for the duration, avoid waste in all its forms—*make every pound of steel and alloys go as far as possible.* If you run into problems, call on our Technical Staff to help you.

ADDRESS DEPT. FM-3

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-8866 . . . W & D

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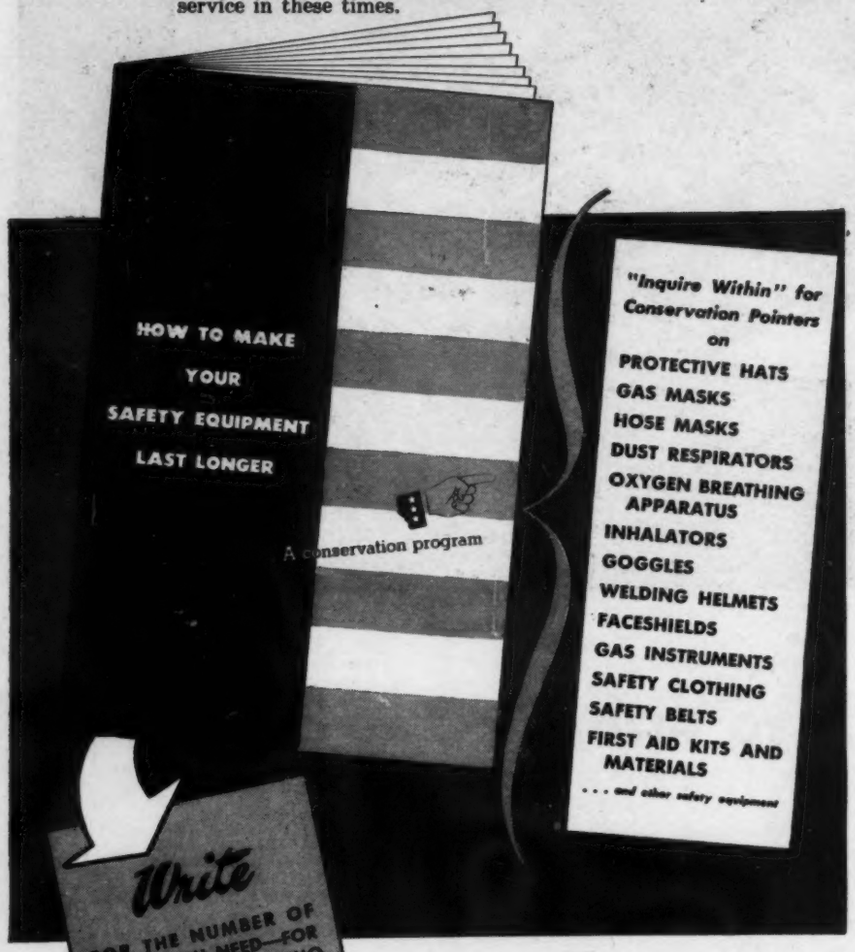
• AUTHORITATIVE
• COMPLETE

READY FOR YOU NOW!

FREE-NO OBLIGATION

This carefully-prepared Conservation Handbook is offered as a working tool to industry by M.S.A., world's largest commercial manufacturer of approved safety equipment. You'll find the detailed suggestions for extending the life of your present safety equipment to be of sound, practical value—for purchasing, operating and maintenance men alike. The Handbook is available for wide distribution, without cost, as a further M.S.A. service in these times.



36 PAGES OF USABLE FACTS ON HOW TO GET THE MOST—FOR THE LONGEST TIME—OUT OF YOUR INVESTMENT IN ESSENTIAL SAFETY EQUIPMENT!

For outstanding production achievement . . . the Maritime "M" Pennant and Victory Fleet Flag, awarded to M·S·A by the U. S. Maritime Commission.

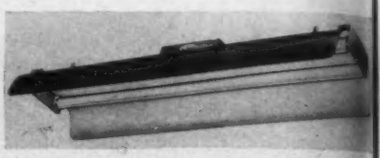
MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STS. · PITTSBURGH, PA.

grime. Also seals concrete. Is said to be easy to apply and maintain, and to give a clean appearance. Flash-Stone Co., Inc., 1930–36 N. 12th St., Philadelphia.

Fluorescent Reflectors

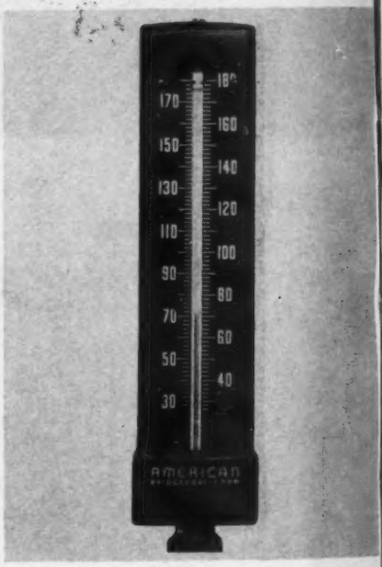
Reflectors made of Silv-A-Tex, a lightweight, sturdy composition that is claimed resistant to heat, moisture, and corrosion, are announced. Reflecting surface is fin-



ished with high-gloss, baked white enamel. Silv-A-Tex non-metallic reflectors may be purchased separately or in units. Units are made for chain or rigid suspension in two models—Victory 40, a 2- or 3-lamp, 40-watt unit; and Victory 100, a 2-lamp, 100-watt unit. Bright Light Reflector Co., Inc., Metropolitan & Morgan Aves., Brooklyn, N. Y.

Glass Thermometer

Made with a reinforced pressed steel case that is claimed practically corrosion-proof, this lightweight glass thermometer has been designed with black scale and yellow



figures for good readability. The tube is red-reading mercury. According to the manufacturer, it is possible to furnish back, side, and oblique angles without using the ball joint. American Schaeffer & Budenberg Instrument Div., Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Protective Coating

Made of a plasticized material, Durma-Gard protective sleeves, aprons, overalls, and coveralls are claimed flame-resistant, impervious to acids such as sulphuric and nitric, and protection against dust, powders, and other irritants. Lightweight and roomy, the garments can be worn over

. . . AND SPEED IT ON WITH SAFETY!

USE THE SLING WITH THE DOUBLE-S*-GRIP MACWHYTE ATLAS

When it's a Macwhyte Atlas Sling they're using, workmen could easily put these words to that popular tune . . . "Lift the load and speed it on with safety" . . . for this braided wire rope sling really means speed plus safety.

And the reason? This picture tells the story.

• Left-Lay Ropes are woven in a right-hand spiral. Right-Lay Ropes are woven in a left-hand spiral.

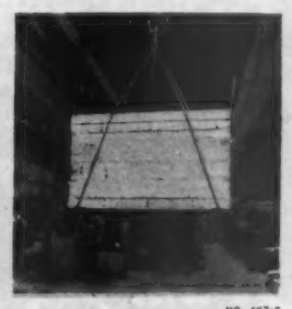
Thus we have a sling body made from opposite lay ropes which are woven in a direction contrary to the lay of the rope itself.

This is what makes Atlas Slings so flexible. This is what gives you Speed Plus Safety.

Let's get together!

You know what work you want slings to do; we can tell you from years of experience the sling design best suited for your work. Save time, let us design your sling. Our engineers can simplify the sling equipment needed, make every bit of sling steel give *maximum* service. That's what *you* want. Your country asks the same.

Speed and Safety, plus all these features, too! • Lightweight, flexible, easy to handle • Positively non-spinning • Kink-Resistant • Patented construction of left-&-right lay ropes • Non-damaging to loads • Store in small space • No splices to wicker • Terminate in natural loop ends • L-O-W final cost.



NO. 687-S

MACWHYTE ATLAS
Braided Wire Rope SLINGS

*"The Sling with the Double-S-Grip: *S-P-E-E-D plus Safety"*

MACWHYTE COMPANY, 2920 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of wire rope to meet every need — Left-&-Right Lay Braided Slings — Aircraft Cable, Aircraft Tie-Rods, and "Safe-Lock" Swaged Terminals.

Mill Depots: New York · Pittsburgh · Chicago · Fort Worth · Portland · Seattle · San Francisco. Distributors throughout the U. S. A.

SPEED WAR PRODUCTION

DARNELL CASTERS

A SAVING AT EVERY TURN

For light, medium or heavy duty service Darnell Casters and Wheels are dependable — saving floors, equipment, money, time and temper.

It will pay you to investigate ● ●

Write for FREE MANUAL

DARNELL CORP. LTD., 60 WALKER ST. NEW YORK, N.Y.
LONG BEACH, CALIFORNIA, 36 N. CLINTON, CHICAGO, ILL.

other clothing. Sleeves are adjustable to fit the wrist and the top is shirred with Lastex. Garments can be washed in soap and water. West Disinfecting Co., 42-16 West St., Long Island City, N. Y.

Cylindrical Containers

Steel containers for high-pressure gases and liquids are available for general use on lower priorities. Made of alloy steel, cylindrical in shape with round bottoms

necked and threaded to specifications, they are in accordance with I.C.C. regulations. Are lightweight and crush without shattering—special non-fragmenting forms are also supplied. Designed for working pressures up to 1800 lb. per sq. in., they range from 20- to 646-cu. in. capacities. Walter Kidde Co., Belleville, N. J.

Floor Patch

Hercules Speedy patch is ready to use on any surface. Old concrete does not have to be chipped or torn up, shallow or deep holes and ruts can be filled. It is claimed to be self-healing and to withstand heavy traffic. Comes in red and concrete color. Evercrete Corp., 19 W. 44th St., New York.

Safety Siphon

For transferring carboy acids or other dangerous liquids, the recently announced "Safety" siphon provides for safety-first in

SPEED UP ALL PRODUCTION DRILLING with these 3 SKILDRILLS!

The many other SKILSAW DRILLS give you a size and type for every drilling job!

● Everywhere SKILDRILLS are boosting War Production by boosting drilling output on every job! In aircraft plants SKILDRILLS speed up "skin-drilling" . . . on tank and engine assembly lines they "shoot holes" in drilling bottlenecks . . . throughout industry they're busy drilling *more holes in less time.* SKILDRILLS are light, compact, powerful . . . they get in tight places *easier* . . . go through tough metals *faster* . . . give you more drilling power and speed for every ounce of weight!

The features that make SKILDRILLS so superior are typical of the full line of SKILSAW DRILLS . . . a size and type for every job from fastest production drilling to heaviest boring and reaming. Ask your distributor to demonstrate SKILSAW DRILLS on your own work. . . today!

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SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Today - as in 1918...

BLAW-KNOX BUILDINGS HAVE GONE TO WAR!

All types of Blaw-Knox Standard Steel Buildings are now serving the armed forces in many parts of the world.

Today—they are helping the war program by providing permanent, weather-tight, firesafe structures for warehouses, airplane hangars, shops, utilities and other specialized military uses.

Tomorrow—after the war, Blaw-Knox will offer an adequate building to economically meet any requirement or application.

Enlist Blaw-Knox help in Your Building Problems

Enlist Blaw-Knox help in solving your building problems right now, provided you are doing war work and steel can be allotted for the purpose.

Interior—note open, unencumbered space. Size and shape of buildings to suit your needs.

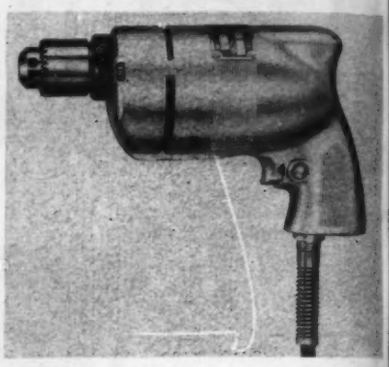
BLAW-KNOX STANDARD STEEL BUILDINGS
BLAW-KNOX DIVISION of Blaw-Knox Company

2031 FARMERS BANK BUILDING, PITTSBURGH, PENNSYLVANIA
NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON

handling. It eliminates pressure by employing an improved and safe principle that allows a free flow of liquid with instantaneous control. Made entirely of plastics, it is claimed to be acid- and corrosion-resistant, flexible, and to have a high tensile strength. Central Scientific Co., 1702 Irving Park Rd., Chicago.

Heavy-Duty Drill

Model 47 Skildrill handles drills up to ¼ inch in steel and ½ inch in wood. Drill weighs 3½ pounds, is 7¼ inches long, and



2⅛ inches wide. Unit is provided with two-pole momentary contact switch that locks for continuous operation. Available in 4 speeds, 1800, 2500, 3500, and 5000 r.p.m. Skilsaw, Inc., 5033–43 Elston Ave., Chicago.

Paints and Enamels

War-Formula interior paints and enamels may be brushed or sprayed on, and cover old or new surfaces of wood, brick, metal, plaster. Furnished in a variety of colors, commercial interior gloss, semi-gloss, or flat paint is available. Mill white flat and gloss, and machine and dado enamels are also included in the War-Formula line. S. C. Johnson & Son, Inc., Racine, Wis.

Paint Can Cover

Econ-O-Can syphon feed cover has been designed to fit most standard quart-size friction-top paint cans. A standard spray

"For a long time the men in our shop were under-working their KENNAMETAL tools. These operators who for years had been using high speed steel tools, were running their machines far below the speeds at which KENNAMETAL cuts most efficiently.

"Those of us who knew KENNAMETAL'S capacity to cut steels at high speeds realized our shop's production could be increased if the men ran their lathes at speeds equal to KENNAMETAL'S ability to take the cuts.

"To help the men step up their production we made copies of the table at the right which gives not only the speeds at which various metals should be cut, but also the correct grade of KENNAMETAL to be used.

"We explained that KENNAMETAL is produced in four grades of hardness. The harder grades are used where tool loads are light and advantage may be taken of greater wear resistance. Grades KH and K3H are used on light finishing cuts or where material being cut is very soft, as SAE 1010, SAE 1020, or free machining steels. Grade KM machines alloy steels, carbon steel castings, forgings, and bar stocks above .25 carbon, and of hardness up to 400 Brinell. Steels from 400 to 500 Brinell require the harder, more crater-resistant grades KH and K3H.

"Since the machinists have been running their machines at the speeds suggested and have used the grades specified, our production has been greatly increased and our tool consumption reduced."

For similar information about the proper use and handling of KENNAMETAL Tools write to McKenna Metals Company for a copy of the new Catalog 43B.

Material to be Cut	State of Metal	Grade	Recommended Speed (ft./min.)
STEELS			
SAE 1045	As forged	KM For Interrupted Cuts or Rough Work	220 to 400
SAE 1045	Hardened		150 to 300
SAE 1045	As cast		220 to 300
SAE 1035	As cast		220 to 300
SAE 1090	Annealed bars		200 to 300
NICKEL CHROME AND NI. CH. MOLY. STEELS			
SAE 3130 to 3140	Forged		200 to 300
SAE 3130 to 3140	301 to 370 Br		120 to 220
SAE 4130 to 4150			
SAE 4320 to 4340	301 to 370 Br		120 to 220
NITROLOY STEEL			150 to 250
CHROMIUM STEELS			
SAE 52100	As forged and Ann.		200 to 300
SAE 52100	427 Brinell		80 to 100
SAE 52100	648 Brinell		20 to 30
18-8 Stainless	As forged		150 to 200
14% Chromium Bars			180 to 250
HIGH SPEED STEELS	Annealed		120 to 220
MONEL METAL			
Monel Metal K	Hardened		70 to 90
Monel Metal S	Hardened		70 to 90
FREE CUTTING STEELS SAE 1112		KH For Continuous Light Cutting or K3H	400 to 600
MALLEABLE IRON	Cast	K4H	200 to 300
COPPER ALLOY IRON	Cast		200 to 300
ALUMINUM SILICON	Cast		500 to 1000
BRASS YELLOW	Cast		500 to 1000

*INVENTED AND MANUFACTURED IN U. S. A.

McKENNA METALS Co.
130 Lloyd Ave., Latrobe, Pa.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain
Trade Mark Reg. U. S. Pat. Off.

KENNAMETAL THE All American CARBIDE

Step Up PRODUCTION!

Fewer shutdowns means more production. Avoid costly delays with *conditioned* water, vital to any industrial process. Get conditioned water with Refinite softeners, filters and other water-conditioning units. Write for catalog—The Refinite Corp.

101 Refinite Bldg., Omaha, Nebraska

SEVEN FACTS

IT WILL PAY YOU TO KNOW ABOUT BROWNHOIST BUCKETS

1. 5 to 22% larger sheaves lengthen rope life.
2. Underslung top block lowers center of gravity.
3. Extra large cover-bracket-bearings easily lubricated.
4. Well-braced, forged Bail Bars give extra strength.
5. Annealed cast steel closing arms increase digging efficiency.
6. Heavy carbon-steel sharpened digging lips (with or without teeth) provide efficient digging.
7. Cables last longer by being kept from contact with material.

Write today for complete catalog of Brownhoist rope reeve, power wheel, special purpose, open type grab, link-type buckets.

INDUSTRIAL BROWNHOIST

BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

gun can be attached. Paint colors may be kept in original cans and the Econ-O-Can cover fitted to the top or additional quart cans with friction covers are available. Master Mfg. Co., 4715–17 N. Damen Ave., Chicago.

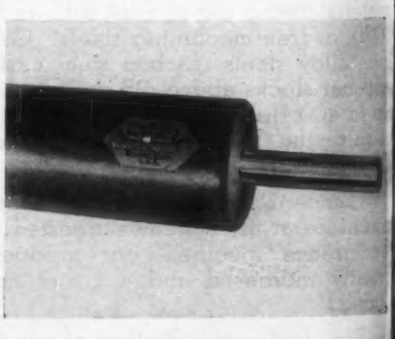
Portable Test Kit

Equipment for routine field testing of relays and electrical operation of 125- to 216-volt secondary network protectors is contained in a small portable case of fiber and plywood. Size 15x11x26 inches, the kit includes voltmeters, switches to alter

circuits, phasing relay and operating mechanism for closing and tripping, red and green indicating lights to show positions of relay contacts, fuses to protect the supply circuit, and supply and test leads. Variable currents and variable voltages for relay testing and mechanism operation are supplied by fixed resistors, a transformer, and a variable autotransformer. Westinghouse Electric & Mfg. Co., E. Pittsburgh.

Plastic Covered Roll

Basically all metal, the body of the roll has a plastic covering which provides a hard, smooth glass-like surface. It is easily cleaned, and is claimed to have a



high wear resistance, being unaffected by most acids and alkalis. Useful as a guide roll, idler, or where exposed steel and iron are objectionable. Rodney Hunt Machine Co., Orange, Mass.

Floor Compound

A 4-purpose floor compound, Absorbol, sprinkled over slippery areas prevents skidding and falls, absorbs grease spots and oil, and smothers flames when thrown on the base of fire, according to the manu-

are Fumes making your workers sick?

Read How PROPELLAIR Ventilating Specialists Solved a Tough Problem Involving Toxic Fumes!

PROPELLAIR VENTILATING EQUIPMENT OFFERS THESE EXCLUSIVE ADVANTAGES

AXIAL-FLOW, AIRFOIL PROPELLERS, especially designed by Propellair engineers, deliver maximum air with minimum horsepower. Air flow is even over all parts of the blades—the *whole* fan works, not just the tips! These unique propellers are also non-overloading—from free air to complete block-off, horsepower remains virtually constant as long as motor speed is constant. The number of blades, and their angle and shape, depend on the job to be done.

CURVED ENTRANCE RING,

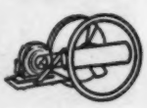
in addition to serving as a sturdy support assembly, reduces tip loss and enables Propellair Fans to deliver *maximum air per horsepower.* Introduced in 1930, as a result of exhaustive experiments and tests by Propellair engineers, this design makes possible the utilization of the "Airfoil" air-movement principle in the *entrance ring* as well as in the *propeller.*

A PROPELLAIR FAN FOR EVERY APPLICATION!

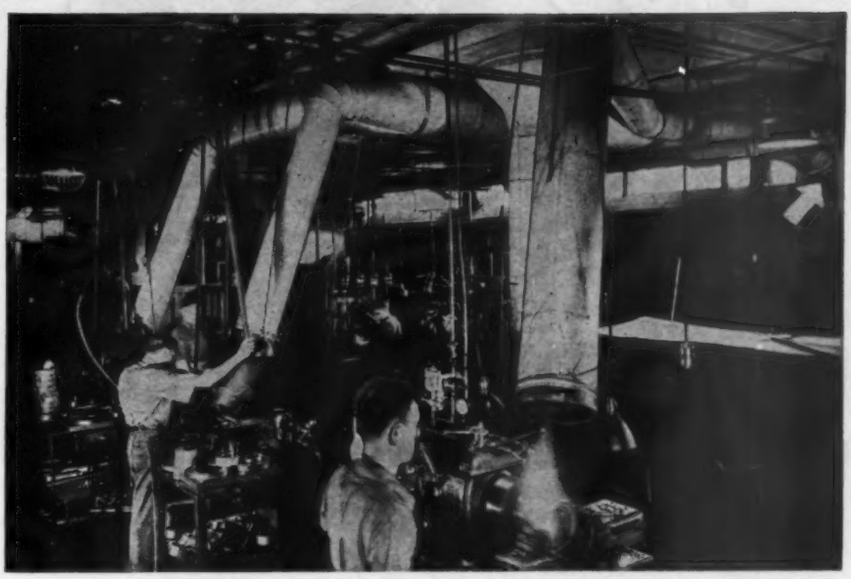
Pictured here are just three of *ten* different types of Propellair Fans. Each of the ten was developed for specific ventilating jobs—is guaranteed to perform them with utmost efficiency, dependability and economy.

CD—Direct connected to electric motors. For ducts, hoods, roof ventilators or panels.

CS—Heavy-duty complete belt-driven unit in duct section. For severe dust, corrosive or explosive vapors.



CU—Low-stand, tiltable, portable cradle fan. For hardening-room service, production-line drying or cooling.



The ducts, one for each lathe, are clearly shown in this photo. Note how they converge at the fan, indicated by the arrow.

Doubled and redoubled war-production schedules forced a prominent manufacturer to install a battery of high-speed lathes in a poorly ventilated basement area. The light cutting oil used produced volatile toxic vapors, resulting in lung irritations, skin infections and serious worker absenteeism. How could these vapors be eliminated?

The problem was solved by Propellair ventilating specialists, who recommended and installed a ¾ h.p. Propellair Fan in a nearby window, with a separate duct extending to each lathe. Serving all of these ducts, the fan provides a volume of 3880 cubic feet per minute, producing air velocities of 2500-3300 feet per minute at each lathe that whisk all the volatile vapors off the work and out the window.

In thousands of war plants everywhere, Propellair ventilating specialists have solved tough air-moving problems of many other types, too. Dust-laden air is removed—heat is carried away or more evenly distributed—cool air is circulated—products are cooled for handling.

Whatever *your* war-production ventilating problem may be, it can be solved skillfully and economically by Propellair men and equipment. Mail the coupon below for complete information!

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INC.
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PROPELLAIR, INC., Springfield, Ohio (5)

Please send me complete information on Propellair Ventilating Equipment.

Name.....*Position*.....

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My ventilating problem involves:

☐ Heat ☐ Fumes ☐ Moisture ☐ Dust

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How DEVOPAKE hides and covers any surface *in just one coat!*

And in these extraordinary times it is just the paint you need to improve **seeing** conditions by properly diffusing all the light available. Devopake boosts morale, jacks-up efficiency at small cost in time and money . . . with no waste of man hours or materials . . . with the least interruption of essential activities.

Devopake is the outstanding answer to your painting problems because:

DEVOPAKE covers more surface per gallon.

DEVOPAKE hides solidly — in one coat — over any type of interior wall surface.

DEVOPAKE'S big-brush workability (or easy application by spray) puts it on quickly, evenly.

DEVOPAKE is a self-sealer and finish-coat in one. It eliminates usual under-coat . . . saves man hours.

DEVOPAKE'S toughness enables it to stand up under hard wear and repeated wash-downs.

DEVOPAKE now comes in 7 practical, ready-mixed colors.

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Write us today for complete information that can help you solve your maintenance paint problems.

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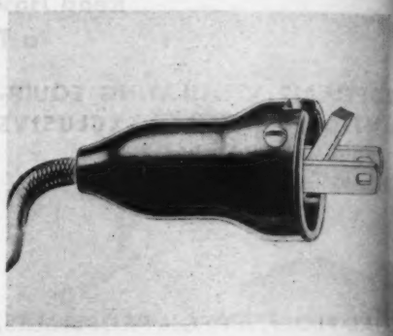
facturer. Can be re-used, when oil soaked, as a sweeping and dust-laying compound. AleXitE Engineering Co., Alexander Bldg., Colorado Springs, Colo.

Circuit Breaker Plug

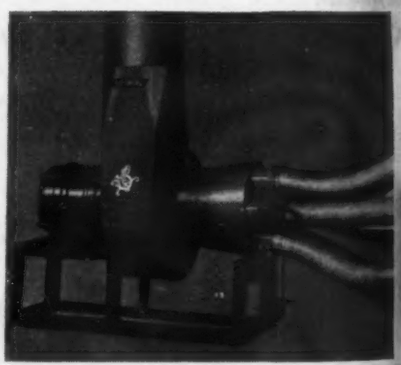
Circuit breaker plug replaces the conventional receptacle plug and is claimed to provide protection against overload, stalling due to low voltage, locked motors, and defective heating devices. It protects fluorescent lighting units in case of a short



circuit or ground. A small red lever breaks the connection. The plug is reset by simply raising and lowering the lever. Actuated by heat it provides a time-delay feature that prevents needless interruptions. On normal overloads, such as sudden surges, this time-delay feature assures that current will be stopped only when conditions become dangerous. Hopax Industries, Inc., 1 N. La Salle St., Chicago.

Blower

Centrifugal type blower, mounted on welded frame, has interchangeable adapters and can be used for suction or blowing. Blower wheel is made of ⅛-in. steel. Driven by direct-connected, 3-hp. ball-



bearing motor. Blower handles fumes, dust, filings, and grinding compounds. None of the materials comes in contact with the motor. Chelsea Fan & Blower Co., 1206 Grove St., Irvington, N. J.

Wartime Flush Valve

Flush valve, called the "Victory" type, has malleable iron body with a plastic sleeve inserted as lining—the former provides strength, while the latter gives a corrosion-resistant plastic inner surface with which the piston comes in contact. The original,

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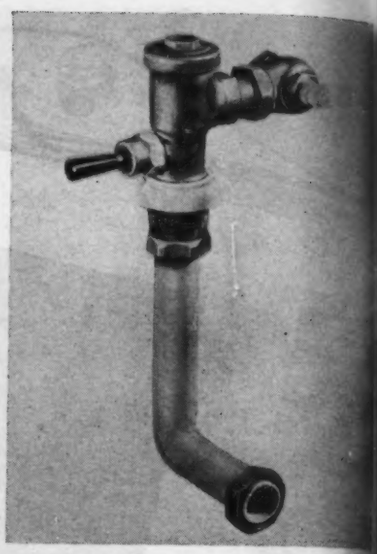


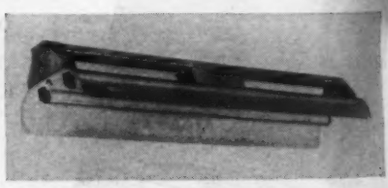
all-brass piston weighed 7 ounces. All but one small part, weighing a fraction of an ounce, is now made of plastic.

The vacuum breaker has a transparent outer shell that permits visual inspection of the flapper and its operation.

Other plastic parts include the handle bushing, and plunger; auxiliary valve; elbow flush connection; bumper ferrules; and regulating screw bushings. Parts of malleable iron include the flush valve cover, control stop body, and coupling nuts. Sloan Valve Co., 4300 W. Lake St., Chicago.

Fluorescent Fixtures

Meeting wartime requirements, Mitchelite fluorescent fixtures are made with a minimum amount of steel. Reflectors are made of Lumenite, claimed to be sturdy, heat-resistant, non-corrosive, and non-scaling. They feature "easy-fit" wireway

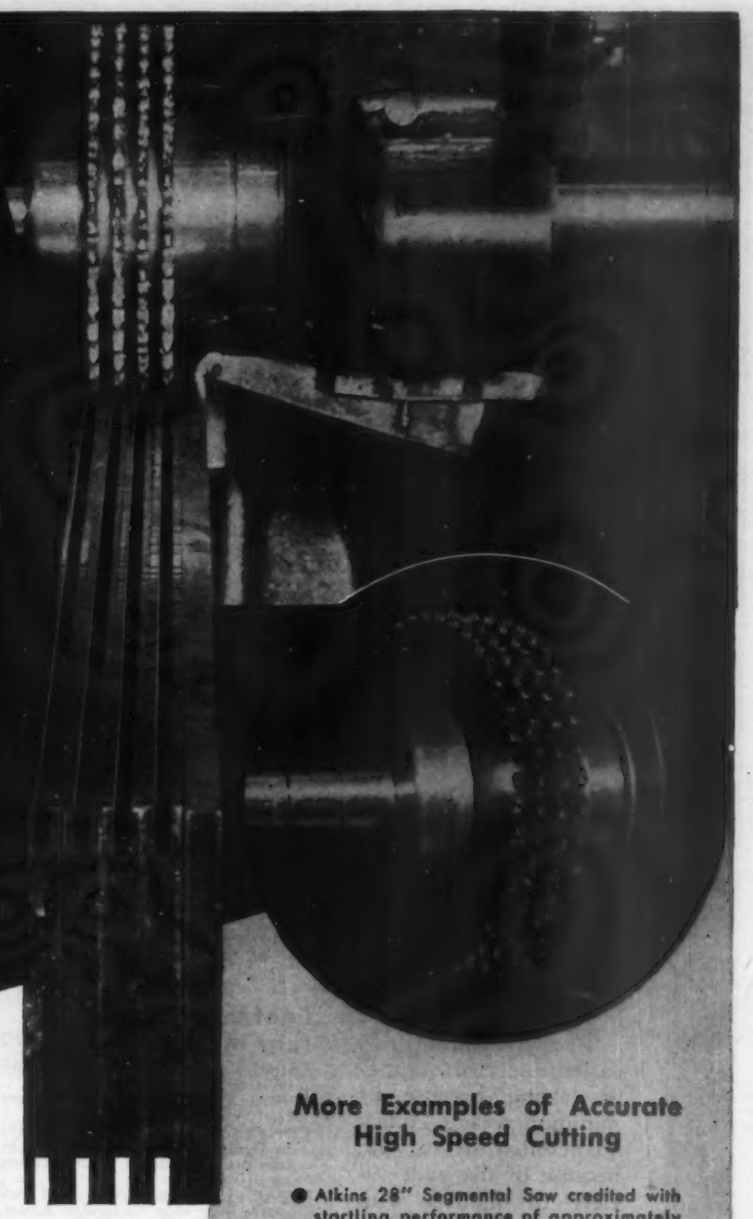


channel for quick joining and mounting for continuous rows. Ballast can be located outside. Simplified end-piece gives ready access to starters and sockets. Available in 2- and 3-light units using 40-watt lamps; 2-light unit using 100-watt lamps; 2-section unit for four 100-watt lamps operating with one For-lamp ballast. Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago.

Fabricated Unit-Spring

Adaptable for use where vibration, noise, or shock is to be absorbed, or as spring cushions in machine construction, unit-spring is fabricated on the principle of a mattress and is usable in single or multiple blocks. Mounting has universal action, taking thrust from any direction. The standard unit is of 9-cell construction, 100-lb. load capacity, and occupies space

ATKINS *Curled Chip* SAWS



Accurate Gang Sawing Speeds Production by Cutting 204" in 8 Hours

● Here is an example of high speed, accurate gang sawing you will recognize as way above average. Four Atkins Curled-Chip Milling Saws, operated in a gang as shown, were cutting ⅜-inch deep, ⅛-inch wide slots in steel plates. The saws were 5-inch diameter, operated at 32 RPM spindle speed, 42 FPM peripheral rim speed. The material cut was SAE 1090 22 Rockwell (and that's plenty hard). Yet these saws cut at the rate of 204" in 8 hours—a truly remarkable record, on work requiring utmost cutting accuracy.

Our file of performance data on the great cutting capacity and long cutting life of Atkins Curled-Chip Saws is growing daily. It offers convincing proof that the Atkins Curled-Chip System (including Milling Saws, Segmental Saws, Powersaw Blades and Band Saws) is today's most practical way of getting work out fast and efficiently. Write for these data today.

More Examples of Accurate High Speed Cutting

- Atkins 28" Segmental Saw credited with startling performance of approximately *7 seconds the cut* on 8" Round Bronze Billets.
- **650% More Production**—Sawing 40 mm. burr-free shell bands at 1 each second with an 8" Curled-Chip Saw instead of 4 every 30 seconds on a screw machine.
- 860 Brass Slabs, 15⅛" x 4½", 59,985 sq. in. *cut between sharpenings* by Atkins 30" Segmental Saw.
- Atkins 28" Segmental Saw records *27 seconds per cut* on 77 mm. stock.
- **Production 45 Times Faster**—A whirlwind reduction in cutting time on 2½" Electric Cast Steel—7½ minutes to 10 seconds is the achievement of Atkins new 6" Curled-Chip Milling Saw.

"You Can Rely on Roper"

16 Standard Sizes

3 Standard Series

21 Standard Drives and Mountings

THOUSANDS OF COMBINATIONS FROM WHICH YOU CAN SELECT A MODEL THAT IS PRACTICALLY

Custom Built to fit Your Job!

"PUMP as you never pumped before" is the order for every Roper Pump installed in America's war plants. And Ropers are pumping like sons of guns . . . constantly driving an unfailing flow of oil into the lubricating and hydraulic systems that help to convert metals into munitions and engines of war.

And there are good reasons why Ropers are selected to do the tough war time jobs . . . 85 years of engineering and building experience . . . only two moving parts (the simplest basic design yet conceived) . . . hydraulically balanced . . . easier to install . . . easier to service . . . longer lasting because of minimum wear . . . quick adaptability to any job because of the wide variety of models with nearly every conceivable capacity, pressure, speed, drive, mounting and piping arrangement.

Features that make Good Pumps

LARGE BRONZE BEARINGS—two on each side.
SPIRAL PUMPING GEARS — perfectly machined and run-in.
CONSTANT LUBRICATION — (1) by liquid being pumped and (2) by lubricating qualities of the bearing metal used.
WEAR PLATES protect face and back plates from wear by foreign matter.
THRUST COLLAR on drive shaft plus sliding joint takes up shock and thrust.
FOUR PIPE OPENINGS provide eight different piping arrangements.
ROPER PACKED BOX is easily and quickly repacked.
SPLINED DRIVE SHAFT forms sliding joint with gear to absorb shock and thrust.
ALWAYS PRIMED—after once primed and in operation.
ONE PIECE BACKPLATE protects working parts from stress and strain.

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ROPER Rotary Pumps

GEO. D. ROPER CORP., ROCKFORD, ILL.

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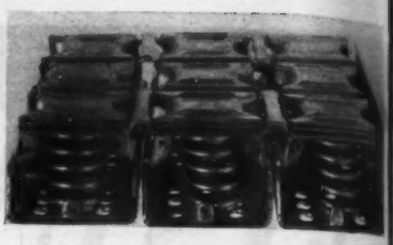


of 2½x2x⅝ inches. All parts are constructed of brass with alloy steel springs. Any cell can be removed and the base drilled to take an anchorage bolt, tightened to the point of starting deflection. Rande Specialty Co., P. O. Box 708, Hoboken, N. J.

Pressure Grease

A grease, sold under the name Motor Mica Reinforced pressure grease, is compounded for use with pressure systems. The manufacturer claims this grease is free from alkalis and acids, maintains lubricating properties at high or low temperatures, and does not deposit carbon. Scientific Lubricants Co., Dept. J, 3462 N. Clark St., Chicago.

Floor Composition

For interior or exterior use, mastic floor composition blends into a closely knit tile structure. The manufacturer claims a greater cohesive strength, tight texture, repellance to water and acids, and good resistance to point loads. It bonds tightly to almost all types of floors, and no chipping or cutting of the old floor is required. The material is shipped in self-contained shipping drums of non-returnable variety. Flash-Stone Co., Inc., 1930–36 N. 12th St., Philadelphia.

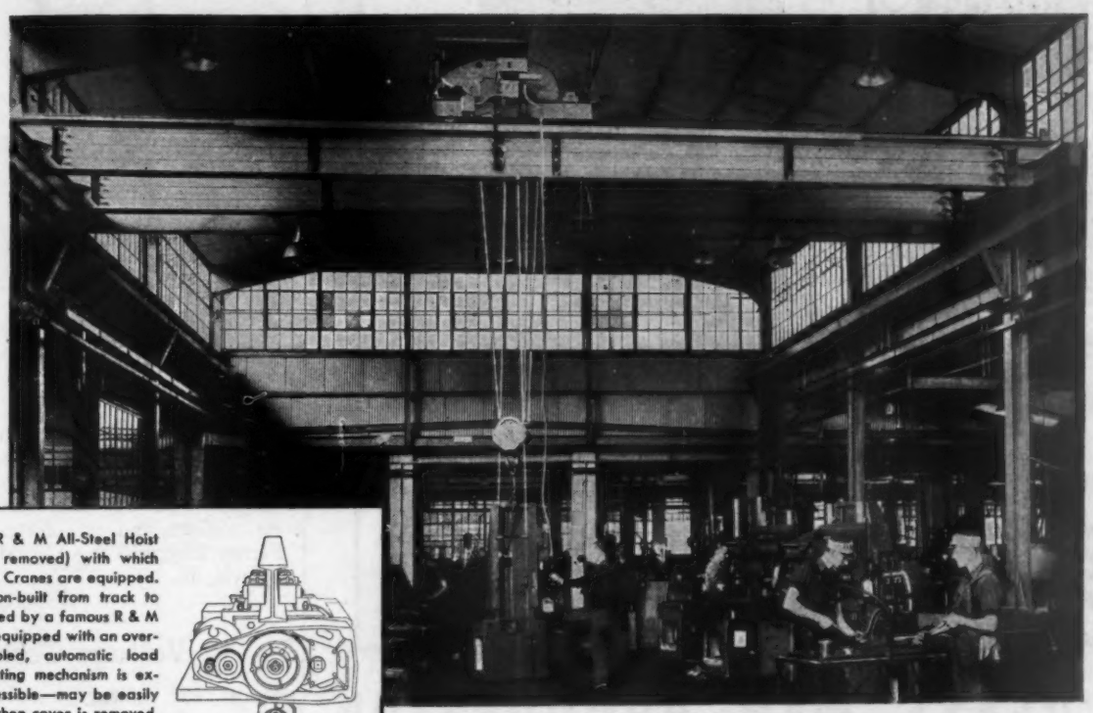
Explosion-Proof Motors

A line of vertical hollow-shaft motors, claimed to be explosion-proof, is now offered for operation in Underwriters' Class I, Group D hazardous gas locations. These motors are designed primarily for pumps handling quantities of volatile ma-

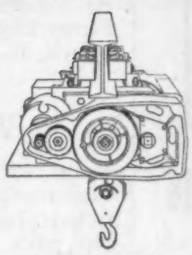
MOVE WORK FAST!

...with R & M Cranes

THREE TO SIX MONTHS DELIVERY, DEPENDING ON TYPE



This R & M 10-ton, 45'-span, 3-motor, floor-control crane is speeding work in a preminent machine tool assembly plant. It is equipped with a two-speed, pendent push-button control hoist.



This is the R & M All-Steel Hoist (with cover removed) with which many R & M Cranes are equipped. It is precision-built from track to hook, powered by a famous R & M Motor, and equipped with an oversize, oil-cooled, automatic load brake. Hoisting mechanism is extremely accessible—may be easily withdrawn when cover is removed. Compact design provides low headroom and maximum lift.

Where's the bottleneck in *your* war-production setup? Whether it's in moving heavy assemblies inside the plant, or in loading or unloading railroad cars, R & M Cranes can help you increase production by fast lifting and conveying and by saving manpower for other vital work.

Depending on the size of the cranes you need, we can make delivery in three to six months—the longer period necessary on larger types. And whichever model you choose in our line, from ½ ton to 25 tons in capacity, you have the assurance of performance, dependability and economy proved in every industry in the country during the past 14 years.

Why not have an R & M Hoist & Crane expert inspect your plant, make a survey of your needs, and recommend the R & M Crane he knows will do the job best? Or, if you prefer, we can send you our new 16-page Bulletin No. 825 A.

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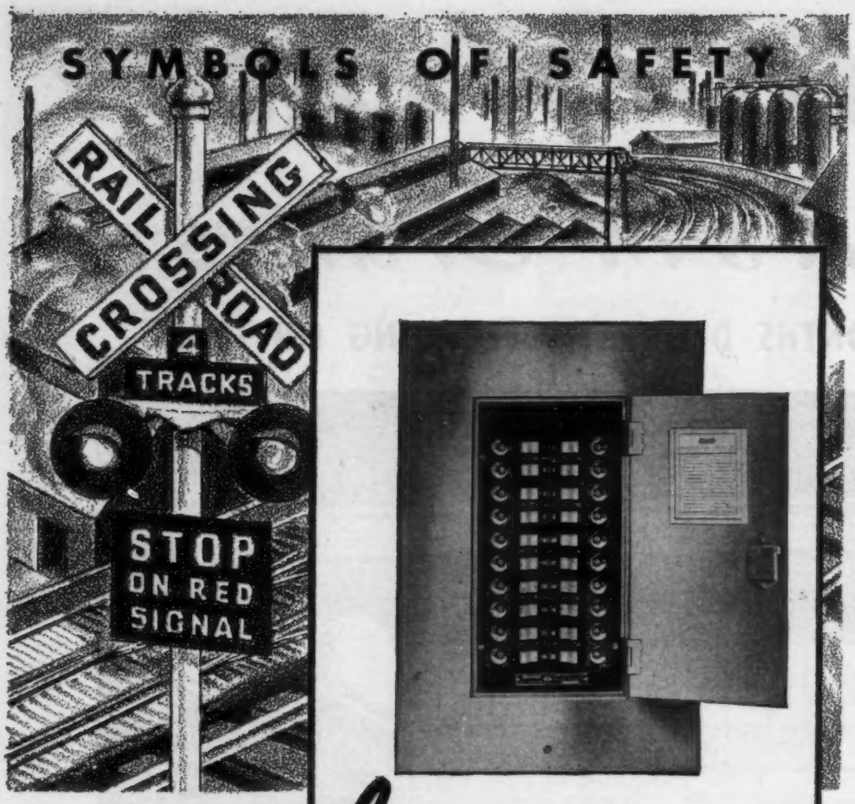

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INCREASE WAR PRODUCTION

Controlled, continuous lighting is essential for increased war production. That's why Federal panelboards are built with special safety features to insure perfect control and protection of lighting and small power circuits.

The rugged construction of Federal's low cost NTPR panelboards, for example, assures permanent alignment of working parts to reduce the danger of short circuiting. But there are many other safety features, such as—switch ahead of every fuse, floating contacts, large wiring gutters. This is true of *all* Federal Panelboards. Follow the leaders—for extra service and safety switch to Federal!

For Complete Panelboard Data

write for catalog 42. Contains all the essential facts on Federal NTPR and Mastertype panelboards.

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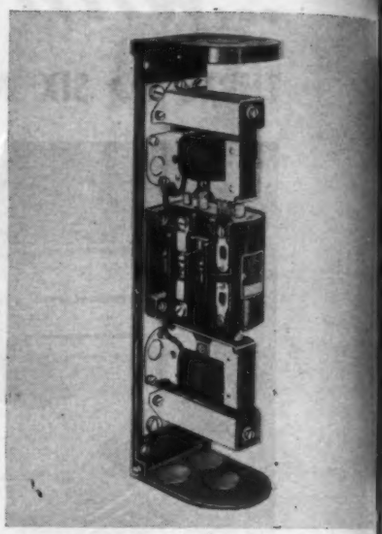
PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES • CIRCUIT BREAKERS

terials such as high octane aviation gaso-line. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.

Magnetic Reversing Switch

This 5-hp. magnetic reversing switch is made as a single unit instead of two sep-arate contactors, a design that reduces



the switch to a compact size and eliminates internal wiring. It is suited for severe plugging service and other heavy duty the makers claim. Has large, double-break sil-ver contacts and no pivots or bearings. Furnas Electric Co., 426 McKee Street, Batavia, Ill.

Voltage Tester

Model 590 voltage tester reads like a thermometer. According to the manu-facturer, connection of the needle-pointed test prods across an electric line auto-matically indicates voltage, frequency, type of current, etc., on the neon bulbs set in the reading panel. Unit is housed in a wooden case $1\frac{3}{4}$x5x$1\frac{3}{8}$ inches, weight

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CUTTING OILS

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Fun in the fifties

It is within the realm of possibility that a nonchalant twirl of the arm and the twist of a lever may be all there is to the drudgery of dishwashing, in the future. Possibly with an electrical circuit as a cleansing agent and heating element to dry . . . dishwashing may well become in a class with dialing a radio, today.

Sounds fantastic, it's true . . . but no more so than many developments of recent years. For the study of electrical science is making fact out of fantasy . . . almost daily!

But wherever the application of electrical circuits appears, if the product is of the finest, there, you are more than likely to find a Cannon Connector . . . in the past, in the present, and in the future.

This round flanged fitting for explosion proof application is just one of hundreds of different styles of connectors built for the aircraft industry. Cannon Connectors are standard equipment in a score of peacetime and wartime industries including radio, television, shipping, sound apparatus, railroads, motion pictures, and the lumber industry. They are considered essential wherever connections must be made quickly and with positive security.

CANNON ELECTRIC

CANNON ELECTRIC

Cannon Electric Development Co., Los Angeles, Calif.

Canadian Factory and Engineering Office: Cannon Electric Co., Ltd., Toronto

REPRESENTATIVES IN PRINCIPAL CITIES — CONSULT YOUR LOCAL TELEPHONE BOOK

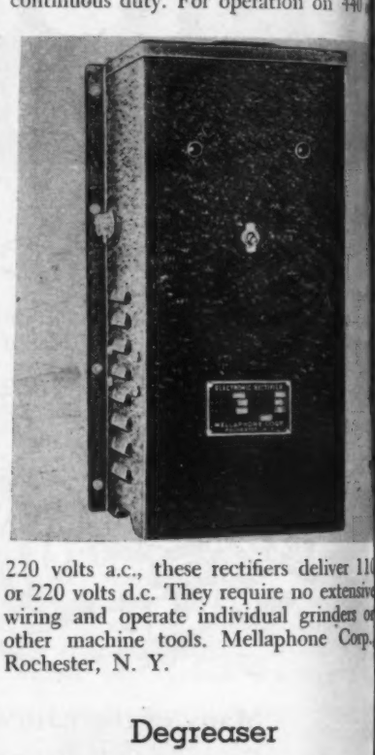
5 ounces. Draws less than 1 milliamp of current. Superior Instruments Co., Dept. T, 227 Fulton St., New York.

Eyeshield

A non-fogging eye protection designed to deflect hazardous flying particles, Shur-gard-Eyeshield is claimed to be easily attached to most types of safety headgear. The transparent, plastic shield is hinged so that it can be positioned before the eyes by a downward flip. When not in use, it lies flat against the hat or cap. Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh.

Rectifier

A rectifier, known as Mellaphone, is electronic in operation and is designed for continuous duty. For operation on 440



220 volts a.c., these rectifiers deliver 110 or 220 volts d.c. They require no extensive wiring and operate individual grinders or other machine tools. Mellaphone Corp., Rochester, N. Y.

Degreaser

Portable, air-cooled vapor and solvent degreaser uses inhibited tetrachlorethylene cleaning solvent known as Phillsolv. Because tetrachlorethylene boils at higher temperature, it has higher density of both liquid and vapor and is claimed more effective as a cleaner. Said to have less toxicity and to be safer and more agreeable to work with. Magnus Chemical Co., Inc., Garwood, N. J.

Lamp Coating

Shatterproof, colorless dip-coating for welders' lamps and light stringers has been announced. Called Bulbkote No. 7-B, the product is claimed to film bulbs with a strong coating which sheds metal sparks and helps reduce shock. It does not cut light efficiency, and according to the manufacturer, will not darken with use. Sold in 5-gal. tins. Peerless Chemical Co., 268 Northampton St., Boston.

I Saw a Labor-Management Committee in Action

(Continued from page 89)

are re-negotiating some right now. This is no time to think about making money. We have got all we can do making munitions."

The workers do not know much about the technicalities of contracts and excess profit taxes. How are we going to make them understand this? "That's up to you, Ed; a good snappy poster to tell the story so that even the elevator girls can get it." Ed promises to do his best at once.

The chairman looks at the clock. "We've got to keep moving, boys," he says. "How did you come out on that absentee test, Tom?"

Tom, who is something of a sartorial symphony in shades of brown, glances at his notes.

"We came out swell. We got the records for this one department and picked out the 50 worst cases. Then we laid a copy of this little pamphlet, 'Absent at Roll Call,' on each man's bench. The pamphlet has a picture of a soldier dead in the front line because supplies hadn't come through. We slapped it down so everybody in the shop saw who got it. Only one of the 50 has been late since."

"Didn't it make them sore?"

"Sure, it made them sore as hell. But it wasn't the management ragging them; it was us, their fellow-workers."

Someone tells of an experiment in another company, where absentees are called *absenteurs* by the union shop paper. The committee first tried writing letters, but got nowhere. Then they decided to try giving the "absenteur" a personal interview by the labor members of the Committee.

"How did it work?"

"They say it worked fine. For two weeks 80 percent have had a perfect record, 10 percent are about the same, though there are bad transportation jams in this group. The rest don't seem to care. They'll probably be fired at the direction of the Committee."

The meeting comes to a close. The noon whistle blows, and after lunch the various members will go back to their regular work.

* * *

One gets a strange feeling out of this. You are not studying a "labor problem." You are not watching union men and their employers. You are watching human beings working together for something which oblit-

(Continued on page 196)

NEW BIO-DYNE TREATMENT FOR BURNS ...A NEW CONCEPT IN WOUND HEALING

★ ***Discovered at a world-famous research institute . . . result of 7 years basic study of cellular growth and metabolism***

★ ***Promotes much more rapid healing . . . shortens disability period***

★ ***Relieves pain, almost immediately, in nearly every case***

★ ***Prevents disfiguring scars where normally they might be expected***

The discovery of biodynes brings a new advance in burn treatment . . . an entirely new concept of wound healing and tissue repair.

It is of particular significance to Medical Directors of industrial plants, since one of the important results Bio-Dyne treatment achieves is a marked shortening of the period of disability.*

Among the results, consistently achieved in exhaustive research and ever-increasing practical applications in hospitals and first aid centers, are (1) Ease of application and treatment; (2) Almost immediate relief of pain; (3) Acceleration of rate of healing and epithelization; (4) Keeps tissue soft, minimizing scar and keloidal tissue formation; (5) Marked shortening of period of disability.

WHAT ARE BIODYNES?

They are neither hormones nor vitamins. Biodynes are a newly discovered substance given off by injured cells which regulate cellular activity. Extracted from living cells and fish livers, these natural cellular products have the power to stimulate cellular growth and respiration. And, according to famous scientists, as cellular respiration increases, healing increases.

**In hundreds of serious burn cases, reported over a 3-year period, evidence showed the average case treated with Bio-Dyne Surgical Dressing healed completely in approximately half the time required by the average case in which other treatments were used.*

Write today for representative case histories from the hundreds in our files—convincing evidence from hospitals and medical departments of industrial plants.

BIO-DYNE Surgical Dressing

NO OTHER PREPARATION FOR USE BY PHYSICIANS AND HOSPITALS CONTAINS BIODYNES.

SPERTI, INC.
Beech & Kenilworth Aves., Norwood Station, Cincinnati, Ohio

Please ship by _____

_____ jars 15-oz. Bio-Dyne Surgical Dressing.....$5.50 per jar
_____ jars 5-lb. Hospital Size.....$21.50 per jar

Terms: 2%—10 days—net 30 days.

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Orders of $100.00 or over prepaid.

Question every fastening job

Mobile Refrigeration, Inc., Long Island City, New York, chooses P-K Self-tapping Screws for Assembly of Several Different Materials

1. Type A — Driven through steel angles into Masonite housings.
2. Type A — Four screws in each of three adjustable hinge plates hold up a 350 lb. door. Fastening is steel plate to birch.
3. Type A — Two screws in each of three hinge butts. Fastening is steel plate to birch.
4. Type A — Two screws in each of three adjustable door fasteners. Fastening is steel plate to birch.
5. Type A — Fasten frame for door glass. Driven through steel into birch.
6. Type A — Hold door armor in place. Driven through steel into birch.
7. Type Z — Fasten chamber unit to base casting. Driven through Masonite into ⅛" angle iron.
8. Type Z — Fasten steel baffle plate to steel angles. These screws are silver coated to withstand extreme testing temperatures.

260 TAPPING OPERATIONS ELIMINATED ON EACH UNIT-

Man-hours and tools saved—Assembly made stronger with P-K Self-tapping Screws

Assembly of this high altitude test-and-calibration-chamber for aircraft and electronic instruments was greatly simplified, and the product made stronger, when the maker wisely "questioned every fastening".

Of more than 500 fastenings required, about half are metal-to-metal, for which machine screws were formerly used. When these were replaced by P-K Type "Z" Screws, 260 tapping operations were eliminated. Since P-K Self-tapping Screws tap their own strong threads as they are driven, one easy operation completes the fastening. They save the man-hours used up in tapping . . . they also eliminate grinding, breakage and replacement of hard-to-get taps.

Assembly of the unit also involves a large number of metal-to-wood and metal-to-Masonite fastenings. Experiments showed that P-K Type "A" Screws would afford much greater security than the conventional wood screws which had been used. Stronger fastenings result because P-K Type "A" Screws are threaded all the way to the head, and are uniform in dimension.

War production needs all the man and tool hours P-K Self-tapping Screws can save. Question every fastening job in your plant . . start now! Call in a P-K Assembly Engineer to help you search out *all* opportunities to apply P-K Self-tapping Screws. Or, mail assembly details for recommendations. Parker-Kalon Corp., 196-200 Varick St., New York.

A TYPE FOR EVERY METAL OR PLASTIC ASSEMBLY

PARKER-KALON

Quality-Controlled

SELF-TAPPING SCREWS

Give the Green Light . to War Assemblies

BLAW-KNOX *Electroforged* GRATING

SAFE: twisted bar does the trick STRONG: one piece electroforged CLEAN: no sharp angles to clog

EASY TO PAINT • OPEN FOR LIGHT AND AIR

Whatever your grating needs—here's how to select the proper size.

WHAT TO SPECIFY WHEN ORDERING BLAW-KNOX ELECTROFORGED GRATING

- ★Size of bars and type.
- ★Painted or galvanized.
- ★Dimensions of area to be covered.
- ★Direction bearing bars are to run.
- ★Is clearance to be allowed.

BLAW-KNOX ELECTROFORGED STAIR TREADS

These treads are designed for the development of unusual strength against impact. Standard sizes and specifications follow:

Abrasive Width	Diamond Plate Width	TYPE "J" — 1" x 1/16" BARS Min. Length	Suggested Max. Length	A
6 3/4"	6 1/16"	1'6"	3'0"	2 1/2"
7 11/16"	7 1/4"	1'6"	3'0"	4 1/2"
9 1/16"	8 1/16"	1'6"	3'6"	4 1/2"
10 1/16"	9 5/16"	1'6"	3'6"	7"
11 1/2"	10 11/16"	1'6"	3'6"	7"

Abrasive Width	Diamond Plate Width	TYPE "L" — 1 1/4" x 1/16" BARS Min. Length	Suggested Max. Length	A
7 11/16"	7 1/4"	2'0"	4'0"	4 1/2"
9 1/16"	8 1/16"	2'0"	4'0"	4 1/2"
10 1/16"	9 5/16"	2'0"	4'0"	7"
11 1/2"	10 11/16"	2'0"	4'6"	7"
12 11/16"	12"	2'0"	4'6"	7"

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.

2031 FARMERS BANK BUILDING PITTSBURGH, PA.

TABLE OF SAFE LOADS BLAW-KNOX ELECTROFORGED GRATING

SIZE OF BEARING BARS 1 IN. APART

Span, ft.-in.		2-0	2-6	3-0	3-6	4-0	4-6	5-0	5-6	6-0	6-6	7-0	8-0	9-0
3/4x3/16	U	330	222	143										
	D	.085	.134	.192										
	C	330	265	215										
	D	.068	.108	.154										
3/4x3/16	U	500	320	217										
	D	.085	.134	.192										
	C	500	400	325										
	D	.068	.108	.154										
1x3/16	U	600	384	267	188	150								
	D	.064	.099	.143	.195	.256								
	C	600	480	400	330	300								
	D	.051	.080	.115	.156	.205								
1x3/16	U	900	580	400	286	225								
	D	.064	.099	.143	.195	.256								
	C	900	725	600	500	450								
	D	.051	.080	.115	.156	.205								
1 1/4x3/16	U	950	600	420	303	232	184	146	120					
	D	.051	.081	.115	.157	.205	.259	.321	.389					
	C	950	750	630	530	465	415	365	330					
	D	.041	.064	.092	.125	.163	.207	.256	.310					
1 1/4x3/16	U	1425	900	633	457	350	278	220	182					
	D	.051	.081	.115	.157	.205	.259	.321	.389					
	C	1425	1125	950	800	700	625	550	500					
	D	.041	.064	.092	.125	.163	.207	.256	.310					
1 1/2x3/16	U	1365	880	610	445	340	266	220	182	150	128	110		
	D	.043	.067	.094	.131	.166	.216	.267	.324	.385	.440	.522		
	C	1365	1100	915	785	680	600	550	500	450	415	385		
	D	.034	.053	.077	.104	.137	.173	.214	.259	.308	.361	.418		
1 1/2x3/16	U	2050	1320	917	672	512	400	330	273	225	192	164		
	D	.043	.067	.094	.131	.166	.216	.267	.324	.385	.440	.522		
	C	2050	1650	1375	1175	1025	900	825	750	675	625	575		
	D	.034	.053	.077	.104	.137	.173	.214	.259	.308	.361	.418		
1 3/4x3/16	U	2800	1780	1230	915	700	544	440	364	308	262	228	175	133
	D	.038	.057	.082	.112	.147	.185	.229	.276	.330	.387	.450	.580	.737
	C	2800	2225	1860	1600	1400	1225	1100	1000	925	850	800	700	600
	D	.029	.046	.066	.090	.117	.148	.183	.221	.264	.306	.358	.468	.598
2x3/16	U	3650	2340	1618	1200	912	723	580	482	400	346	293	225	178
	D	.032	.050	.072	.099	.128	.163	.201	.243	.289	.341	.397	.516	.651
	C	3650	2925	2425	2100	1825	1625	1450	1325	1200	1125	1025	900	800
	D	.026	.040	.057	.078	.102	.129	.160	.193	.230	.269	.314	.409	.518
2 1/4x3/16	U	4650	2960	2065	1515	1150	912	740	608	516	438	379	288	228
	D	.027	.044	.064	.087	.113	.148	.177	.214	.255	.305	.349	.455	.574
	C	4650	3700	3100	2650	2300	2050	1850	1675	1550	1425	1325	1150	1025
	D	.023	.035	.051	.070	.091	.115	.142	.172	.204	.240	.279	.364	.460

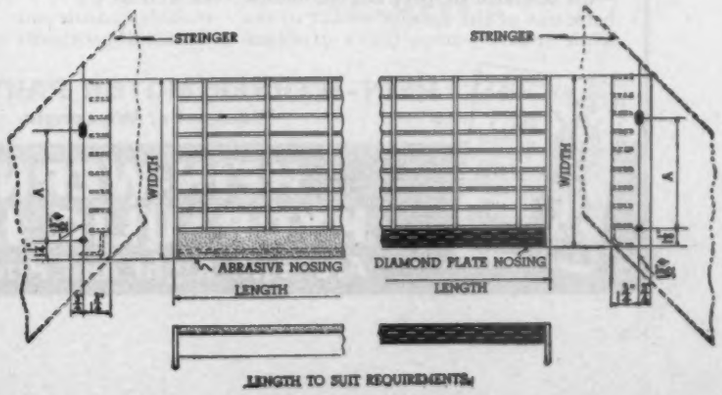
C—Safe concentrated load in pounds per foot of width

U—Safe uniform load in pounds per foot of width

D—Deflection in inches

Spans to right of heavy line not recommended

Maximum allowable fiber stress 16,000 lbs. per sq. in.



Speed up war production jobs!

Dual Operation of Two Speed Pumps

is an outstanding and exclusive feature of this 30 ton capacity model

Factories doing war work can move machinery, lift heavy loads, bend rods, press bushings, etc. quicker and easier with

HEIN-WERNER HYDRAULIC JACKS

Model 30.11A (illustrated) is unusually fast and easy operating. In raising ram to load, and in lifting light loads, the *high speed pump* and the *high pressure pump*, are *combined* to attain maximum speed... If pumping becomes an effort —the operator simply pulls the handle back out of the handle socket of the high speed pump, (thus disengaging the high speed pump)—and he finishes lifting the load by utilizing only the high pressure pump which operates at slower speed and minimum effort.

For full details on Model 30.11A, as well as on 3, 5, 8, 12 and 20 ton models, consult your industrial supply distributor, or write us.

HEIN-WERNER MOTOR PARTS CORP.
Waukesha, Wisconsin

HEIN-WERNER HYDRAULIC JACKS
Are Built Right and Priced Right

(*Continued from page 189*)

erates the lines that are supposed to divide them.

Labor - Management Committees were proposed by Donald Nelson of the WPB in the early spring of 1942, under the program known as the "War Production Drive." The plan was purely voluntary for war plants to adopt or not as they saw fit. The first response of labor was favorable. Presidents Murray of CIO and Green of AFL indorsed the idea. The first response from management was a cry of pain. Was this another "Reuther Plan," to deliver the function of managing production over to the unions? Nelson assured the managers that it was not. Further, it had nothing at all to do with collective bargaining. It was to deal entirely with production and morale, and avoid wages, hours, and grievances.

With these flat assurances, the outcries largely subsided, and committees began to form. By the end of the summer there were 1200 of them. Today there are close to 2500.

One chief aim of the plan is to speed production. Let us look at the place where suggestions for increased production originate. We go into a huge room humming with turret lathes and filled with workers. Over in the corner at a bench covered with hand tools is a big red-headed man with a firm mouth, pale blue eyes, and plenty of chin. His job is to repair dies. He has won the award for the outstanding suggestion in this New Jersey plant. He designed a new set of dies which reduced by 20 percent the operations in manufacturing an important part for fire-fighting equipment on planes and ships.

I shake his broad hand and congratulate him. "Have you been thinking about any other improvements?"

"Yes, sir. I am working on 15 others." He produces a neat handwritten list from the corner of the bench.

"When do you think about them?"

"When I'm driving to work. I think about them too when the broken dies come over to this bench; how to have fewer broken."

"Did you ever put in any suggestions before the Production Drive started last spring?"

"No, sir. I've been here many years, but I kept them to myself."

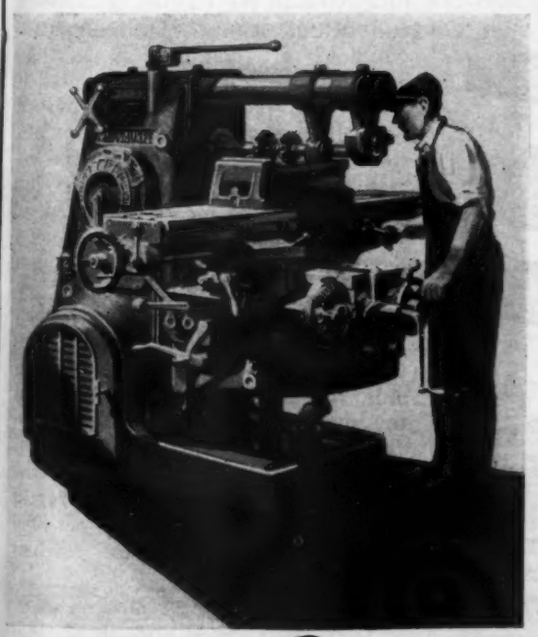
"Why?"

"Because the foreman might think he was not onto his job. He might get sore."

"He doesn't think so now?"

"No. We're all in it together now. I put in all the ideas I can, unless they are crazy. I get hold of a crazy

...I'm doing this for Bill!



I'm one of America's women war workers... Millions of other American women like me have taken their places at machines — on assembly and testing lines — voluntarily — to release "Bill" and men like him for work only men can do.

"Bill" is fighting somewhere overseas — fighting to meet the challenge to our country's freedom as well as to keep this the kind of a world we want for our home — our children — our future together.

I believe every woman working with me realizes that the machines and tools we operate help to hasten the day of Victory — help "Bill" and his kind to finish the job "they" set out to do.

We at Kearney & Trecker look forward to the day when "Bill" returns — when the machine tools we build will again be used to make more and finer things for people to use and enjoy — the things that have always made America the finest country in which to live.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

"Buy Victory with War Bonds"

Milwaukee MACHINE TOOLS

USE OF PROPER METAL

CUTS BEARING FAILURES TO A MINIMUM

Bearing failures can be reduced to a minimum by using a metal that has been "alloyed" specially for the particular application. No one bearing alloy incorporates all the physical characteristics needed to meet all possible working conditions. Average conditions call for good resistance to compression plus excellent anti-frictional qualities. Under extreme conditions some of the anti-friction qualities must be sacrificed to obtain either malleability or hardness. Of the five Magnolia Bearing Metals listed below ONE is RIGHT for your application.

PHYSICAL CHARACTERISTICS

BEARING METAL	ULTIMATE STRENGTH lb. per sq. in.	YIELD POINT lb. per sq. in.	BRINELL HARDNESS	POURING RANGE deg. Fahrenheit
ADAMANT Super-Genuine	12,850	8,625	22.8	875-1050
DEFENDER	16,100	7,685	19.5	850-900
MAGNOLIA Anti-friction	17,500	5,440	21.8	825-900
POWER Nickel-Genuine	17,500	10,850	27	900-1000
PYRAMID	17,850	8,875	24	875-1000

90% of bearings in use today are subject to uniform speed and only moderate pressures, as in electric motors, line shafting and general machinery. For such services, use Magnolia Anti-friction Metal.

When bearings are subjected to heavy sustained pressures, such as in rolling-mill machinery, use lead-base Pyramid or tin base Power, hard metals which will not squeeze out.

For shock loads, which would crack the harder bearing metals, use lead-base Defender or tin-base Adamant, tough yet malleable metals. Internal combustion engines and trap rock crushers are typical applications.

GENERAL USE

HEAVY LOADS

SHOCK LOADS

REG. U.S. PAT. OFF.

NEW BULLETIN

Write for FREE 8-page bulletin which shows what bearing metal to use where and gives many helpful hints on how to keep bearings on the job.

MAGNOLIA METAL CO. · ELIZABETH, N. J.

MAGNOLIA BEARING METALS

one now and then. But I think up more good ones than I used to. Now you take this strip of metal here. . . ." He could have talked all afternoon explaining these excellent technical ideas—which he used to keep locked up in his head.

The plant this idea man worked in was one of four I visited in New Jersey. They employed nearly 50,000 workers among them. Three had collective bargaining agreements with international unions, one with a local independent union. All had excellent labor relations before the drive started. These plants belonged to the 20 percent of committees which are doing an outstanding job the country over. Another 20 percent, I gathered, were paper organizations doing no harm and no particular good. The rest of the 2500 are on their way, but with a long way to go.

In three of the plants I visited, I found transportation and car pooling systems worked out by the committees with Einsteinian precision. They had full-time employees plotting the movements of every worker's car with colored pins on great wall maps. They had a card file showing the transportation routes of every worker in the plant, cross-indexed three ways. In two cases, the transportation department had taken over the functions of the workers' local rationing boards. All gasoline and tire rationing was centrally handled. Employees had only to come to the office of their own plant, saving the hours they used to spend cooling their heels in local boards all over the map.

One of the plants makes metal hose, vital in the engines of bombers and fighter planes. The committee got hold of a complete airplane engine of the latest design, mounted it on a little truck, and had it pushed down the aisles of all the departments, so that every employee could see exactly how his work fitted into the engine and thus into the war effort.

Another committee had set up a monitor system, whereby every day in each department a worker is appointed to act as official housekeeper. He patrols the shop at regular intervals looking for oily rags, fire hazards, bad lighting, crates left around to trip over, blocked passages, machine scrap not cleaned up. It is his shop for the day, and he is the cop. In due course every worker in the company will have felt personal responsibility for a clean, efficient shop.

* * *

These are perhaps little things that we have been watching. But at a score of points we have seen the latent energy, good will, and intelli-

COMMANDOS of the Assembly Line...

Speed Nuts

they're tough!

SPEED NUTS are truly the commandos of the assembly lines. They are tough — and fast in action.They are now being rushed into aircraft factories where they are vitally needed on the assembly lines.

Spring Steel SPEED NUTS are approved by the U. S. Army Air Forces and the Bureau of Aeronautics for most all non-structural attachments. Conversion to the use of Speed Nuts on all approved applications releases critical bar stock steel for other important uses.

Our Engineering Dept. will be glad to assist you in determining the proper approved locations where SPEED NUTS may be used. Request for information or assistance will receive immediate attention.

AIRCRAFT KEEP 'EM FLYING

TINNERMAN PRODUCTS INC.
2096 FULTON ROAD, CLEVELAND, OHIO

IN CANADA:
Wallace Barnes Co., Ltd., Hamilton, Ontario

IN ENGLAND
Simmonds Aerocessories, Ltd., London

Speed Nuts THE FASTEST THING IN FASTENINGS! Speed-Clips

JEWELOX *Metal Working* CLOTH

THE JEWEL BRAND OF ALUMINUM OXIDE

Specially processed for high strength and maximum grain adherence, coated with the hardest, toughest abrasive in commercial use, Jewelox Cloth has proved its all-round usefulness. Jewelox Cloth is grinding rifle breech blocks, smoothing aircraft assemblies, polishing valve stems for aviation engines, finishing Diesel engine crankshafts for submarines . . . and doing hundreds of other "must" jobs as well as it did its usual peacetime work.

Jewelox Discs . . . standard in diameters from 4 to 53 inches, in grits from 120 to 16, and in both cloth and combination backings.
Jewelox Belts . . . sizes to fit any machine, grits to fit any job, made by the famous "Velvet Joint" process to end bumping and jumping.
Jewelox Rolls . . . in widths from ¼ to 28 inches, on light or heavy backings, in every grit. Handiest of all forms for many job shops.
Jewelox Sheets . . . every standard size, grit and weight of backing, correctly flexed for the work it is to do.

Order Jewelox Metal Working Cloth from Your Distributor, or Ask Us for Samples.

Abrasive Products, Inc., 519 Pearl Street, South Braintree, Massachusetts.

ABRASIVE PRODUCTS INC.

SOUTH BRAINTREE MASSACHUSETTS

JEWELOX • JEWEL EMERY • JEWEL GARNET JEWELITE • JEWEL FLINT • NEW PROCESS

gence of the ordinary worker be drawn out and encouraged, occasi ally bursting into a really brill technical improvement.

Ever since the machine age beg in what William Blake called " dark, Satanic mills," that latent ene has been pretty well sealed up, wi a loss to civilization that defies calc lation. It is beginning to come o now. In the plants where productio committees are really functioning perhaps 500 of them the nation over a great rich mine of human effo never before tapped on any such sca is being slowly opened. If it cou be opened completely, what a flo of wealth—material and spiritual—i could bring for workers, for industry for the whole country!

Will the mine close when the wa ends? Of all the managers and work ers I talked to, not one thought so To a man they believed that some thing too valuable had been discovered ever to lay aside a method of co operation between labor and manage ment that may be, as the vice-presiden of one company said, "the dawn o a new era."

Good Food—and No Time Lost

(*Continued from page 93*)

welders, troop down a big battlewag on's gangway, or gather from nearby points. The first men off run for a place in line. But they do not need to, because it never seems to take long to get served.

At this point alone, there are two booths providing complete service. Each has two lines. In addition, sev eral small booths serve coffee, milk, or ice cream, as a supplement to lunches brought from home.

At the counters in the main booths, each worker, on reaching the head of the line, finds a paper tray specially designed with apertures into which cups and containers containing food and beverages can be conveniently placed. He finds bread, crackers, and a wooden fork and spoon in one of the apertures and he proceeds to pick up his meal.

And here is where the timesaving comes in. Instead of having to tell a cafeteria server what he wants and wait for her to dish it out, he finds each item of food all ready for him, and kept warm in a covered paper container. Each item is plainly marked. He picks it up and moves along. This system takes only half

PAINT THAT STAR WELL, MISS...

..to millions of conquered people it's the symbol of liberation

● Even where the heel of the Axis oppressor grinds deepest there are still men who dare to hope. Conquered men who nightly look to the sky for the *flying star* that tells them help is coming . . . the flying star that identifies the war planes of the United Nations.

Like most man-made signs, this is a *painted* star. But in mass-producing planes for America and its allies, U. S. manufacturers can't slow down for tedious hand-painting. So today, hundreds of efficient little ladies, like the one shown above, are busy *spray-painting* this symbol of liberty on each plane—with modern DeVilbiss Spray Equipment.

This is only one of *many* ways DeVilbiss Equipment is helping America's great aircraft industry to "get 'em there—sooner". DeVilbiss Spray Systems save time in wing doping, in finishing fuselages, motors, and accessories, in caulking seams, cementing fabric parts, and coating engines with grease for overseas shipment.

Today, in *all* fields of war production, from bullets to battleships, DeVilbiss Equipment is saving precious time wherever there is a painting, coating, or finishing operation. And tomorrow, when this war has been won, you can look to DeVilbiss for new spray techniques and equipment that will provide even faster, more efficient finishing for the better peacetime products America will have a right to expect.

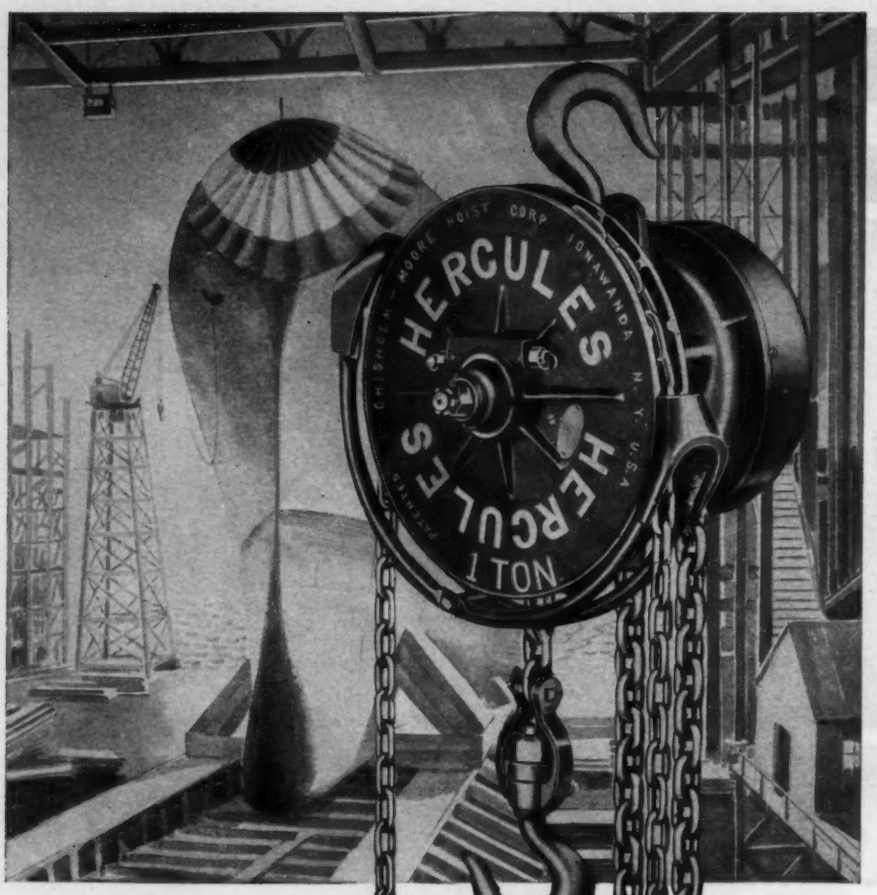
THE DEVILBISS COMPANY • TOLEDO, OHIO

Canadian Plant: WINDSOR, ONTARIO

PROUD to have won the coveted Army-Navy "E" for excellence in war production, the men and woman of DeVilbiss pledge to continue giving their all-out best—for Victory.

DEVILBISS SPRAY SYSTEMS

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS



In War Production
TRAFFIC JAMS ARE OUT

In building the weapons of war and the ships that transport them, CM Hercules trucks and Hoists are contributing to new records in production efficiency.

The CM Hercules High-Speed, Spur-Geared Hoist is known in industry everywhere as the hoist that can "take it"...year in and year out. Features a shielded lift wheel ...load chain guides that prevent twisting or slipping... adjustable brake...gears packed in grease and enclosed in dust-proof, oil-tight housing...equipped with CM "Inswell" Electric Weld Chain. In load capacities from ¼ to 40 tons. All the advantages are detailed and illustrated in Bulletin 126E. Yours on request.

CM HERCULES

★ ★ ★

INVEST REGULARLY IN VICTORY—BUY WAR BONDS AND STAMPS

★ ★ ★

CHISHOLM-MOORE HOIST CORPORATION

(Division of Columbus-McKinnon Chain Corp.)

120 FREMONT AVENUE, TONAWANDA, NEW YORK

BRANCH OFFICES: NEW YORK • CHICAGO • CLEVELAND

the time of usual cafeteria service, a cording to Navy Yard officials.

If the worker desires a full meal 40 cents, he starts by taking a 12- container of hot soup and placi it in one aperture of the pa tray. Next he has a choice of two h entrees. A typical choice is meat l and mashed potatoes or Spanish r with sausages. He picks up the la squat entree container, sets it in a other hole in the tray. Next he tak the pint cup or container of milk coffee, places it in the aperture served for it. The fifth aperture is another squat container filled w dessert—a gelatine dessert, for stance. By this time he has a co plete meal in covered containers a tray that is "jostle proof."

After completing his selection, worker sits on a bench, or perches some iron casting, and eats his me The band still plays over the lou speaker. The worker finishes lun and has time left to stroll about a pass the time of day with frien on the job.

Quick Service in Shops

In the shops, the process necessa is speedier. There are only 15 mi utes for lunch. To make it possi for a worker to get a hot, appetizi meal, a system is being worked o under which at some point in th department there will be a counter g ing the worker the same type of fo service.

The Navy Yard menus are the pro uct of careful study, with scientis at Columbia University analyzin them and advising on vitamin con tent. No dish is offered more than once a week, some not more than once in two or three weeks. Entrees include beef stew, lamb stew, Navy mulligan, bacon and beans, chile con carne, spaghetti and meat sauce, fish cakes and beans, and cold cuts and potato salad.

It would have been impossible, offi cials believe, to have set up food serv ice at the waterfront with the usual cafeteria dishes and glassware. Space for tables and chairs is out of the question. Not only would time have been lost in serving the food, but also time, money, and space would have been consumed setting up dishwash ing facilities. Sufficient dishwashers and dishwashing equipment would have been difficult to get. Paper cups and containers therefore were the only practical solution.

Several methods are being tried for getting hot food from the cen tral kitchens to booths and counters all over the Navy Yard. Some of it is transported in inserts for steam tables in specially insulated containers. Coffee is moved in 5- to 10-gal. ther

LADISH *quality* DROP FORGINGS

ARMY E NAVY

Ladish leadership in drop forgings springs from the sharp focus of its superior experience and technical talent on the constant target, "Quality." Unexcelled facilities under constant metallurgical control produce forgings meeting uniformly, the most exacting engineering requirements.

LADISH DROP FORGE CO.

PLANT AND GENERAL OFFICES: CUDAHY, WISCONSIN

TO MARK PROGRESS

Industrial Dermatitis with its resulting loss of time, is as useful to the enemy as a secret agent! Dermatitis (skin disease) is an occupational hazard—and as such is *preventable*. Two West products will help to prevent this production-wasting scourge.

LAN-O-KLEEN*—The *Hand Soap* that has *proven* its value in helping to prevent occupational skin diseases. Lan-O-Kleen is an effective cleaner that works mildly and without harsh chemical action—leaving the hands feeling better, more fit for work. Lan-O-Kleen is a powdered soap of *mildly* alkaline reaction compounded with granular corn-meal, which has been impregnated (by an exclusive process) with LANOLIN an oil almost identical to the natural oils secreted by the glands of the skin. Lanolin helps nature to maintain a normal, healthy skin condition.

WEST PROTECTIVE CREAMS
An external protection to help guard your workers from most of the wide variety of skin irritants which may lead to dermatitis. A West specialist will determine which of the many West Protective Creams are best suited for use in your industry. In addition, the West laboratories stand ready and prepared to evolve still other formulae if special conditions in your plant impose a hazard not effectively encountered by creams of West's standard series.

* Trade Mark Reg. U. S. Pat. Off.

55 BRANCHES · HELPING TO GUARD INDUSTRIAL HEALTH · COAST TO COAST

CLIP TO YOUR BUSINESS LETTERHEAD PLEASE
West Disinfecting Company, 42-16 West St., Long Island City, N. Y. Dept. J.
Please send me detailed information on:
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Name..... Title.....

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42-16 WEST STREET · LONG ISLAND CITY · N. Y.

mos containers. Experiments are in progress in pre-packing the hot food in paper cups and containers at the central kitchens and transporting it to the eating places in ovens. Eventually the individual containers of hot food will be served from griddles at the booths and counters.

Under the new system, the proportion of workers who eat a wholesome meal is on the increase, and workers are thus starting the second part of their shift with plenty of energy.

Peoria Plans for Post-War

(*Continued from page 96*)

reduced armament manufacture; the migration of workers left jobless overnight; the return of millions of soldiers; the demands of the nation for merchandise cut off by the war; opportunity for the use of new designs, new materials, new products.

"This report does not ask you to share trade secrets. It does ask you to do a job now that must be done sooner or later. It offers you the use of research data from the Committee for Economic Development. It invites you to pool the results of your own private and individual planning so that industry may prove to government that American business is ready for the great reorganization.

"You are asked to do these things:

"1. Invest some group or individual in your own business with authority to prepare for you a report on 'Post-War Planning.'

"2. Give careful consideration to new products, new improvements, new materials, new markets and new opportunities. (In general, the country must aim at a production of peacetime goods at 40 percent and an employment of 11 percent over 1940 figures.)

"3. Fill out the simple form on page 4 and deliver to the chairman of the Peoria Action Committee for filing with the National Committee.

"Admittedly, this all means planning in the dark. We do not know when the war will end, or how. The plans you make today are subject to later change. Some say, 'Let's win the war first!' But the best way to win the peace is to start now. An important part of winning the war is to be sure that when the last battle is fought the remaining part of the job can be done in such a way that we will gain from the victory—not lose!

"You will find it stimulating to

your officers and production and merchandising departments to try to bring post-war problems into sharper focus. Some say, 'We do not have the time or manpower!' But perhaps the keen interest of certain responsible executives will win extra effort for the task. It is already known that many Peoria institutions have pledged themselves to find the best possible answers to the questions on page 4. It is urged that you, too, contribute your bit, through post-war planning, to post-war prosperity."

A list of pertinent questions was included in the presentation. Answers to them were not requested by the committee. They were simply intended to be typical questions that cooperating companies might well ask of themselves—for their own guidance. The questions follow:

What new products can we market when the war ends?

What development work can we start now—however slowly?

What plans must be made to organize men, money, and equipment?

How long will it take us to convert our factories?

What technical improvements in design or processes can we apply?

What material, purchased for war production, can be converted?

Will new materials, lately been developed, be applicable?

Shall we take our suppliers of raw materials into conference?

Will certain imports, when available, favorably affect costs or processes?

Are we building up proper depreciation and obsolescence reserves?

How will we rebuild our sales, advertising, or dealer organizations?

Shall we ask our customers to reveal their post-war requirements?

Shall we train present workers for post-war production?

Shall we plan to interest labor, so it will know what part it may play?

What provision shall we make for rehiring former employees when they return from the armed services?

Page 4 of the presentation is shown on page 96. It was from a compilation of the returns that the action committee was able to report one month later on the results of this initial survey of 1940 employment, present employment, and first estimate of post-war employment. Those results have already been cited. To repeat, the survey indicated that factories in Peoria employ 30,000 people today. They expect to employ 29,000 when the war is over.

A further conclusion of the committee is that, if employment is main-

An Important Message to

Technical Men

The war has carried the manufacturing age to a new peak! Production demands have created technical problems the like of which the world has never seen before! The services of engineers are at a premium. Especially the services of one particular class—executive engineers—*engineers with business training;* engineers who can "run the show."

In these critical times, the nation needs engineers of executive ability *now, today*—not five, or ten years from now! The shortage of such men is acute—even more acute than that of skilled production workers. And company heads, aware of this situation, are offering high rewards to engineers who have the necessary training in industrial management.

Golden Opportunity for Engineers

In this new era, the engineer with vision and foresight has a golden opportunity. He will realize that out of today's tremendous production battles will emerge technical men who not only will play a major role in winning the war, but who also will be firmly entrenched in key executive positions when peace comes.

However, before the engineer can take over executive responsibilities, he must acquire knowledge of the other divisions of business—of marketing, accounting and finance. He has of necessity a vast amount of technical training and experience. But in order to grasp the opportunities that present themselves today—to assume leadership on the production front—he must *also* have an understanding of practical business principles and methods.

The Alexander Hamilton Institute's intensive executive training can give you this essential business training to supplement your technical skill.

FREE help for engineers

Ever since the war began, there has been an unusually heavy demand on the part of our technically-trained subscribers for the Institute's special guide on "How to Prepare an Engineering Report". Extra copies of this practical, helpful 72-page Guide are now available and, for a limited time only, will be sent free to all technical men who use the coupon at the right.

134,000 men on the operating side of business have enrolled for this training. More than 37,500 are technical men—engineers, chemists, metallurgists—many of whom are today heads of our huge war industries.

This training appeals to engineers because it gives them access to the thinking and experience of the country's great business minds. It is especially valuable to such men because it is basic, not specialized—broad in scope, providing a thorough groundwork in the fundamentals underlying *all* business. It covers the principles that every top executive must understand. It applies to all types of industrial organizations, because all types of organizations are based on these same fundamentals.

Business and Industrial Leaders Contribute

The Institute's training plan has the endorsement of leading industrialists and business men. And it is only because these high-ranking executives recognize its value and give their cooperation that such a plan is possible. Among those who contribute to the Course are such men as Frederick W. Pickard, Vice President and Director, E. I. DuPont de Nemours & Co.; Thomas J. Watson, President, International Business Machines Corp.; James D. Mooney, President, General Motors Overseas Corp.; Clifton Slusser, Vice President, Goodyear Tire and Rubber Co. and Colby M. Chester, Chairman of the Board, General Foods Corp.

Send for "FORGING AHEAD IN BUSINESS"

The facts about the Institute's plan and what it can do for you are printed in the 64-page book, "Forging Ahead in Business". This book in its own right is well worth your reading. It might almost be called a handbook of business training. It is a book you will be glad to have in your library, and it will be sent to you without cost. Simply fill in and mail the attached coupon *today*.

Alexander Hamilton Institute
Dept. 24, 73 West 23rd Street, New York, N. Y.
In Canada, 54 Wellington St., West, Toronto Ont.
Please mail me a copy of the 64-page book—"FORGING AHEAD IN BUSINESS" and also a copy of "HOW TO PREPARE AN ENGINEERING REPORT," both without cost.

Name.....

Business Address.....

.....

Position.....

Home Address.....

This motor got on the job

"Rush new motor Air Express" was the order a supplier received at 9 A.M. Ready for pickup at 10, it was taken to the airport, flown hundreds of miles to destination . . . and installed on a vital war job that same afternoon.

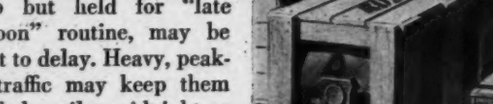
This motor was delayed

Shipments ready for morning pickup but held for "late afternoon" routine, may be subject to delay. Heavy, peak-hour traffic may keep them grounded until a midnight or early morning plane.

For FASTEST delivery—Air Express!

To move emergency parts and critical material at 3-mile-a-minute speed, Air Express is on the job around the clock—not only on the home front, but working hand in hand with Army and Navy Air Transport services to supply our fighting fronts throughout the world.

You can help us give you the most efficient service in two important ways: SHIP EARLY—as soon as shipment is ready—to assure *fastest* delivery. PACK COMPACTLY—to conserve valuable space. Get our handy "Shipping Estimator" for finding costs and transit time. Write Dept. PR, Railway Express Agency, 230 Park Avenue, New York City.



AIR EXPRESS

Gets there FIRST

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION

Representing the AIRLINES of the United States

tained in factories, it will automatically be maintained in retail, wholesale, and service establishments. Although such organizations were not included in the survey, a check of employers of some 2500 persons in service occupations indicates that they, too, think they can come close to holding employment to today's figures.

The Peoria plan, then, is as simple as that. Of the 49 companies approached by the committee, 45 reported—and those 45 employ 97.5 percent of the workers in Peoria's plants. Practically all of the plants are now engaged 100 percent in war production.

A few details on the work of the action committee will serve to round out the picture. This committee began its follow-up work a week after the check sheets were distributed. The members split up the names on the list, each man going after people he knew. Some had been "too busy." A few had forgotten all about it. In a handful of cases the pressure had to be turned on, with the result that estimates were in the nature of horseback opinions. For the most part, however, the check sheets were conscientiously filled out, and it is a sure thing that the few hurried estimates did not change the total picture.

Work Sheets Burned

It was a total picture, of course, that the committee was after. No individual figures were released. In fact, the cooperating companies were assured that the reports they made would be absolutely confidential; the original check sheets and all other work sheets were burned as soon as the consolidated report was ready.

Now as to the results, Walter Gardner had this to say after the job was done.

"I don't believe the answer of any individual firm was worth a damn. If we were to do the job over today, it would be different, or next month it would be different, but I believe our total figures are valuable. . . .

"Another thing is that we analyzed the dangers, hazards, and impacts of the post-war period, and changed our attitude toward them from dangers and hazards to opportunities. Having gone through this, we see opportunities in the post-war world. We already have committees in some of the large organizations following up the matter for their industries. One company has appointed a new official who has nothing to do but follow up on post-war activities. There are particular individuals who are ready to carry on this work when the next chapter is written."

There, of course, is the real worth-

One of the strangest Murders of all time

This is not a pleasant story. We are about to name the murderer in a case that has long been listed as suicide . . . and that murderer is still alive, known to many who read this story.

It happened many years ago. A man named John Fitch was supposed to have taken his own life. The truth is, he was killed — in one of the most reasonless, strange and brutal of all crimes.

He was a shabby man, who tramped through life with the frenzy of a fanatic, clutching a vision under his arm — the plans, designs and models of an invention that would revolutionize this world and bring a new era of wealth and progress to the people of his country . . . They told him that it couldn't be done.

For 15 years he shouted in a wilderness of deaf indifference, hammered at the closed doors of political thought, was branded as crazy, humiliated in public, bereft of funds, and finally killed. They say that he took an overdose of narcotic pills, but John Fitch was murdered.

He was murdered by indifference! Ignorance, stupidity and political blindness killed John Fitch — but not the vision he had offered to the world. It was the plans of a steamboat, designed, built and successfully operated 20 years before the world ever heard of the man named Robert Fulton.

We have a purpose in telling this story. It's simply this: Men are still murdered by indifference. Vision is still the victim of "It can't be done", *perhaps now more than ever before!* And because this is true, we believe that a single fact about Jones & Lamson may be important to you.

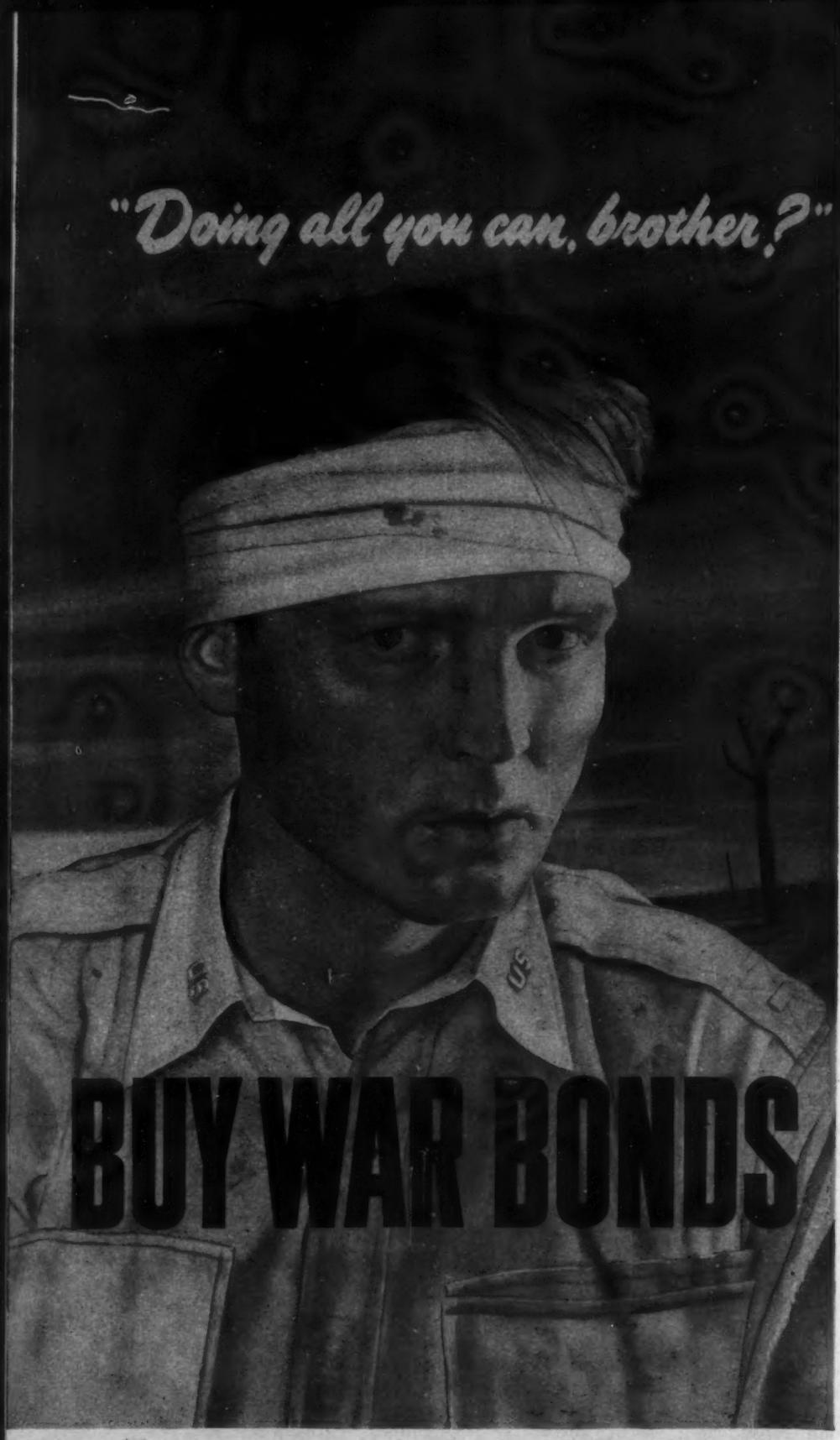
Today, the foremost engineers and designers in America are entrusting their plans and problems to Jones & Lamson for counsel, service and technical assistance in the use of precision machine tools.

If it CAN be done . . . and if tools are needed to do it . . . Jones & Lamson engineers and service men are considered among the best qualified in America to help you. Call upon them!

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Die Heads

J&L JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.

Profit-producing Machine Tools



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Sales Representatives in Principal Cities

buell
DUST RECOVERY SYSTEMS

CONSULT BUELL *First* IN DUST RECOVERY
for Chemical • Rock Product • Metallic • Food • Flue or any other dusts

while result of the Peoria surve
Peoria's estimate that it will emplo
29,000 after the war is still a gues
however intelligent, and as such ma
be unimportant. After all, when
the war going to end? What will
the speed of demobilization? And
on. On the answers to dozens
questions like those will depen
Peoria's ability to carry out its hop
The really important thing is that
fair-sized handful of men in Peo
are already seeking the answers to
those questions. It is important th
they are already planning.

How One Plant Plans

At Caterpillar Tractor Company,
far the biggest employer in Peor
the job has been handed to D.
Robison, who is adding it to his ma
other responsibilities as vice-presid
in charge of sales and advertising.
has already formed a post-war pla
ning committee made up of half
dozen department heads. Each
these men has been assigned the jo
of exploring all kinds of problems
his special field. This explorato
work will be finished on May 1, an
all the answers will then be put to
gether. Out of them all, on or abou
July 1, will come a skeleton post-wa
plan.

To indicate the kind of things Ca
erpillar's post-war planners are thinki
ing about, here are sample question
from the long list concerning produc
development and production.

1. What new products do we have
in the laboratory or in the develop-
ment stage that could be put on the
market immediately after the war
ends?

2. What engineering, designing, or
other development must we do on new
products before they can be put into
production? When and how should
this work be scheduled?

3. What plans can we make now
to provide better post-war products
at lower prices?

4. What plans can we make now
to convert our factories to peacetime
production? How long will it take
to put those plans into operation?

5. What changes in plant layout,
if any, should be made at the time
of reconversion, in the interest of im-
proving efficiency?

6. What equipment or tools should
we scrap or replace?

7. Will a plant shutdown be needed
to reconvert and relocate facilities?

8. Should post-war production vol

Official Photo U. S. Army Signal Corps.

POKING OUR SNOUT IN HITLER'S BUSINESS

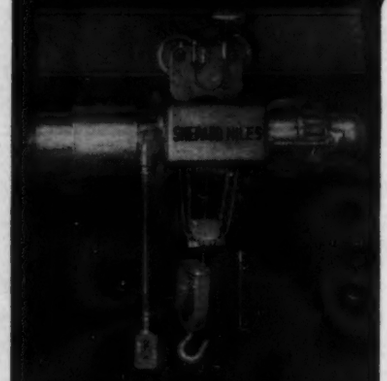
Whether it's a rapid-firing 75 mounted on a tank, or the stinging tail-end of a Flying Fortress . . . *you can bet your bottom dollar* it's interference that Mr. Schickelgruber could do without! For our planes, tanks and guns in the hands of our boys and our allies have put a serious crimp in the Axis.

American production is the bulwark behind the Allied Nations. And, Ball Bearings *keep the wheels turning* . . . ever faster and steadier. Ball Bearings help to make high-speed grinding and boring machines possible. They help to spin the yarn and weave the cloth that clothes our armies. They're working on machines that produce bullets, helmets, rifles, pistols, bayonets, goggles, shoes, parachutes, mess kits, and everything else a fighting man needs. Every week, more millions of Ball Bearings go on the job . . . you can understand why our stocks are often low. The Fafnir Bearing Company, New Britain, Conn.

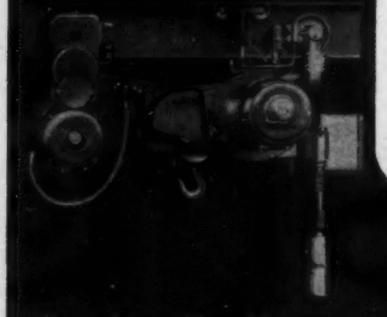
FAFNIR

BALL BEARINGS

Lift Convey Deposit



Shepard Niles "Liftabout" general utility hoist, equipped with push-type trolley. Where accurate spotting is desired, hand-racked trolleys are recommended. Where considerable distance and fast travel speed is needed, a motor-driven trolley is an economical investment.



Motor-driven, Close Clearance or Low Head Room Hoist. Available with either push-type, hand-racked or motor-driven trolleys.

THE purpose of a hoist is to lift, convey, and deposit materials. Sounds simple, doesn't it? However, in choosing the right type of hoist for any given job, many conditions must be given thorough study.

Weights of loads, speed and distance of travel, both vertical and horizontal, as well as frequency of use are among the many factors which must first be considered for maximum hoist efficiency.

Perhaps your materials handling problem is one which requires complete coverage of a large area. If so, a Single Beam Hoist, in conjunction with a Single Beam Crane, shown above, will do the job. Or, if your requirements are for lifting only, a bolt-suspended hoist is the answer.

Whatever *your* materials handling problem, you may rest assured that Shepard Niles has the correct equipment for you. Put your problem up to a Shepard Niles representative.

Write for Bulletin No. 127.

SHEPARD NILES

CRANE & HOIST CORP.

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ume be calculated on a work week of 48, 44, or 40 hours?

9. Assuming that our post-war production will be different from our pre-war line, what products will be built in each plant unit, and do we have too much or too little capacity to handle the probable volume?

Similarly, a post-war committee has been set up at Keystone Steel & Wire Company, and is already functioning. Its membership includes the production manager, comptroller, assistant general sales manager, manager of industrial sales, and superintendent of the wire mill.

At Willamette Hyster Company there is no formal post-war planning committee, but active planning is being done under the direction of Frank Ross who figures the planning job is fundamentally the same kind he has always done, the chief difference being that it is more difficult. Thus he looks at it as a challenge and, as of today, knows exactly what he will start doing the minute the war ends. Obviously his plans are flexible.

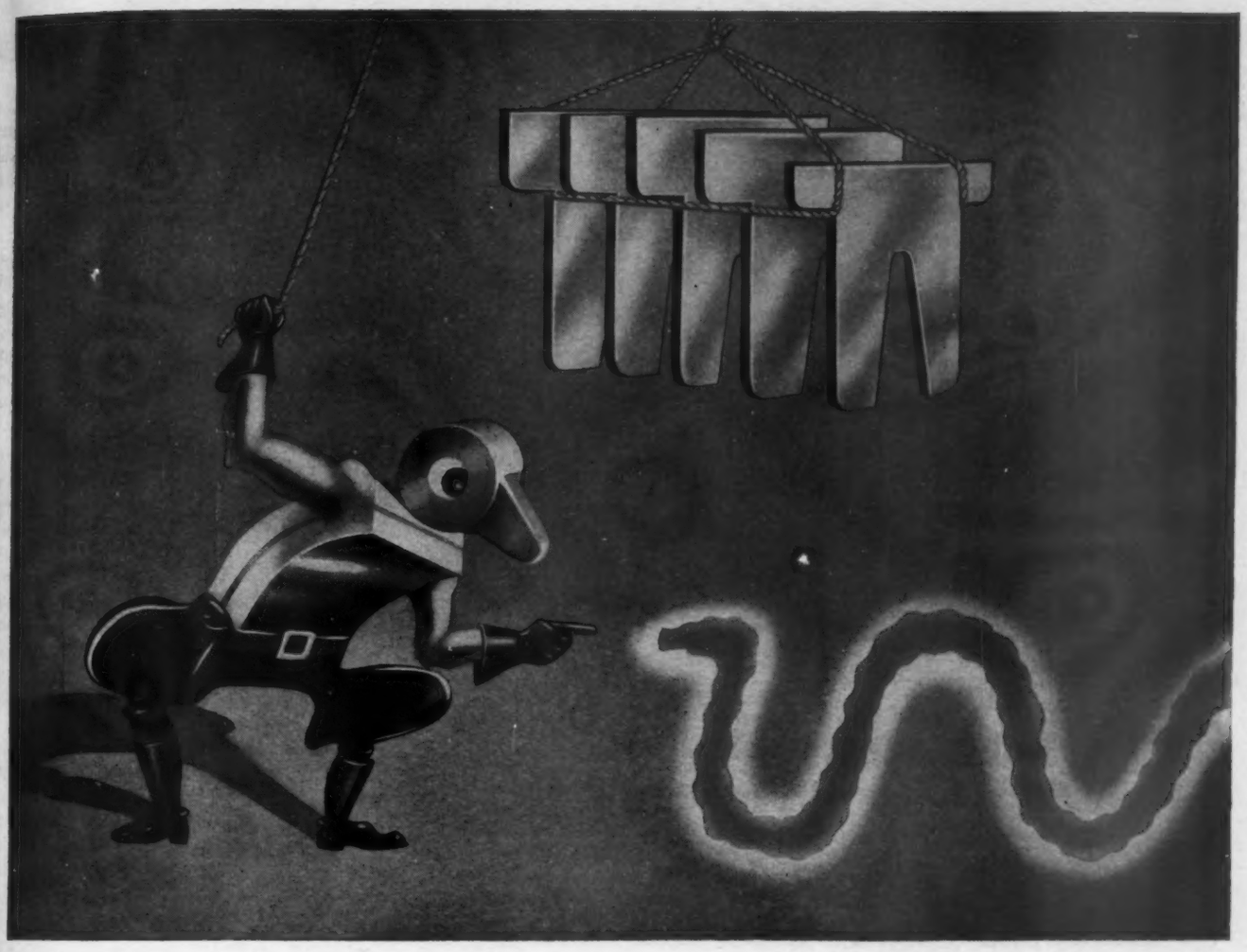
That, in outline, is what Peoria has been up to. It is the kind of job that CED hopes to stimulate other communities into doing. Similar surveys are already under way in Baltimore, Wheeling, Reading, and Rochester, N. Y. It is only a beginning, but a beginning nevertheless. If dozens of other cities will make the same kind of survey that Peoria has made, and if thousands of other industrial concerns will begin now to figure what they are going to do after this war, it is logical to conclude that our chances of winning the peace will be greatly enhanced.

Wanted: Incentives for the Production Front

(*Continued from page 109*)

is that so many of our leaders, unlike Stalin, fail to perceive the difference between the incentives required for saving our way of life and the incentives they believe essential for their new, but still ill-defined and more or less covert, social revolution. In order to win its war for self-preservation, a people must find some way of persuading every citizen to add, gladly, his individual utmost to his country's grand total utmost of hand, head, heart, and soul. But how can the appeal for this vital concord be fully heeded when it is accompanied by efforts, however humanitarian their ultimate intention, to set citizen group against citizen group?

Will the choice between self-pres-



"one false move and you're Dead!"

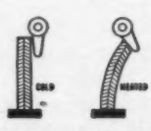
Current that gets out of hand and threatens equipment or power circuits gets short shrift when the circuit is protected by Westinghouse "De-ion" Circuit Breakers.

With uncanny accuracy, this "De-ion" protective device outguesses the current, beats dangerous disturbances to the punch. Momentary, harmless overloads are passed without interruption; but when the circuit is actually threatened, the sensitive Bi-metal element goes into action, *quick!* The circuit's broken, the arc quenched, in the space of a blink of an eye.

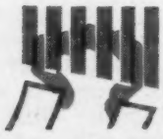
It protects itself, too. The fast action minimizes arc effects, lengthens contact life. Its factory-set calibration is not disturbed. And, when the interruption has been corrected, a simple flip of the indicating handle restores service in seconds. No time lost locating a busy maintenance man; no parts to repair or replace.

Protect equipment and electrical circuits with Westinghouse "De-ion" Circuit Breakers. Ratings to 600 amperes; enclosures for any type of service. Call Westinghouse today. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-21267



THIS IS THE BRAIN that tells whether an overload is dangerous or not. It's Westinghouse Bi-metal. Two different metals which react differently under heat are bonded together. Dangerous overloads cause this Bi-metal to bend, tripping the interrupting mechanism, opening the circuit.



THIS IS THE BRAWN that quenches the arc. Made up of parallel metal plates in the form of a grid, it draws the arc into the chamber, divides it into segments and smothers it between the plates . . . it all happens in the space of half a cycle!

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

"DE-ION" CIRCUIT BREAKERS

LESS CARE with CAREY

● Ask any power engineer why he likes Carey Insulations . . . any owner of a Carey Roof why he favors this particular roof . . . any user of other Carey Products what he thinks of them . . . the answer is—"DEPENDABILITY."

● "Dependable Products since 1873" represents much more than a slogan. It is proof of long experience—an evidence of scientific research—an assurance of high quality.

● The result is that Carey Products stand up to the conditions for which they were made. They are dependable in service, economical in cost, reduce maintenance and deliver plus values. Industry uses them with confidence. If your needs include products of Asphalt, Asbestos and Magnesia it will be to your advantage to consult a Carey representative. A nationwide organization is ready to serve you. Write our nearest Branch Office or address Dept. 31.

USE MORE Carey PRODUCTS

Roofings, Roof Coatings, Fireproof Sidings, Flooring, Wallboard, Ducts for Heating and Air Conditioning Systems, Waterproofing Materials, Asbestos Paper and Millboard, Asbestos Sweeping Compound, and many other products of ASPHALT, ASBESTOS and MAGNESIA

THE PHILIP CAREY MFG. COMPANY
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO
In Canada: The Philip Carey Company, Ltd., Office and Factory: Lennoxville, P. Q.

ervation and social revolution have a wait—and victory be postponed—unt war casualties or war stalling frighte our public into demanding an answ to its insistent "Which?"

Meanwhile, politics to the contra notwithstanding, the country's cr cial demand for production forces M Industrialist, willy-nilly, to ponde how he can secure the utmost ha fellow-workers can be persuaded to pr duce for the enemy's immediate d feat and destruction.

How? By means of what appea and motivations?

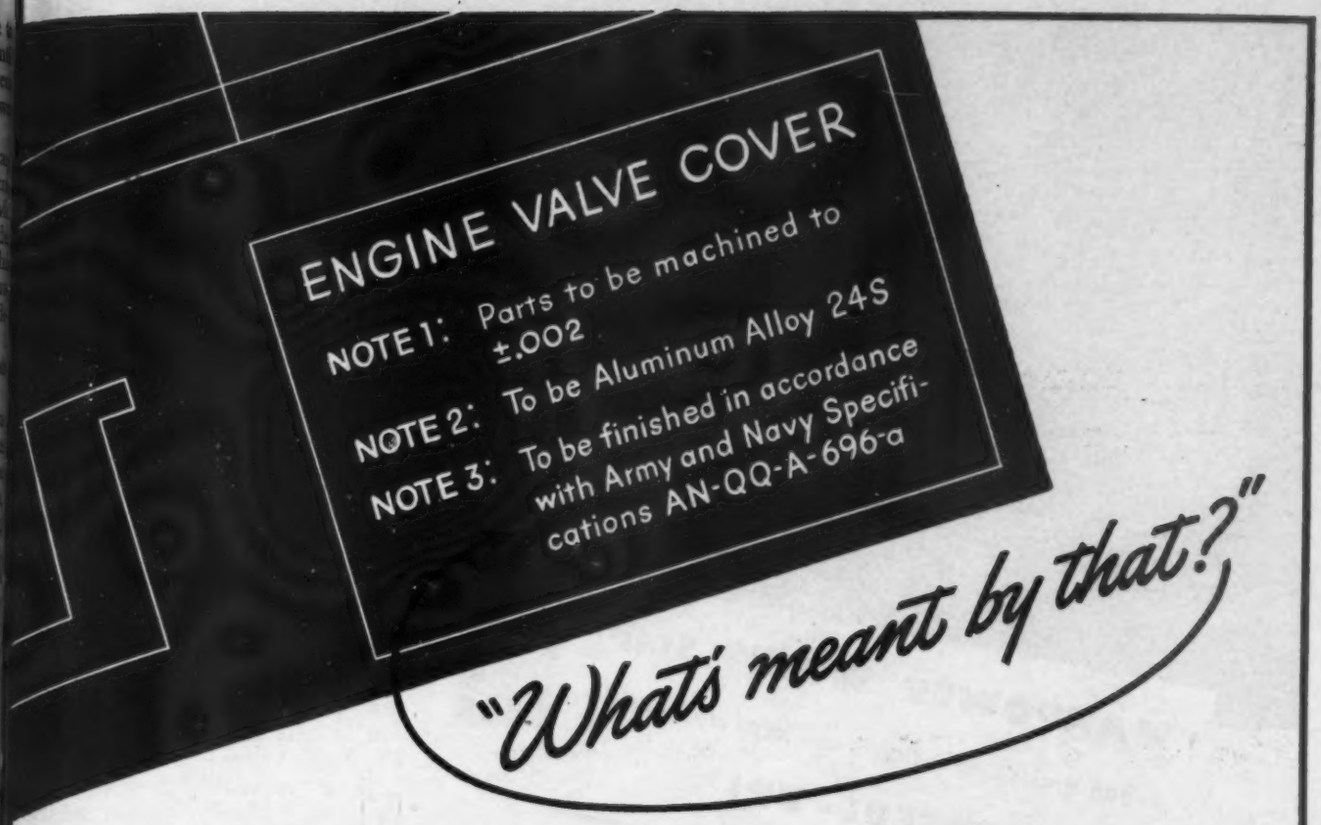
Even before the war, the depressio reshuffled those now available. Sinc '33, labor and government hav united in a drive not for productio but for more jobs—for work-sharin Along with the legalized 40-hour week the CIO in particular has led (wit governmental blessing) a revolt awa from incentive pay toward daywor Directly this revolt appeared in th contract, pressure was continuou concentrated on lessening the dail stint agreed upon. Where both sy tems continued, pressure has been con tinuous for narrowing the spread be tween the two. In one plant the original gap of nearly 20 percent ha been gradually whittled down to a present 5.

Careless Employers

It must be granted that this drive has been facilitated by the carelessness of many employers. Management has too often assumed that if pieceworkers stand idle by their machines, they suffer all the loss. Such employees can hardly be blamed if, even when work is plentiful, they suffer from a permanent hangover and insist that henceforth nobody shall be allowed to "play the hog" and work himself and his companions out of their jobs. ("Traitors—that's what I call them piece-rate fellows who do two days' work in one! Traitors to their class!") Sidney Hillman is rightly given credit for approving the use of scientific management's time studies for increasing output only after he and his garment industry's employers had first installed their plan of unemployment insurance.

Nevertheless, those managers are right who claim that a shift back to incentive pay could today so increase the worker's output as well as his weekly "take-home" that the Little Steel formula would not be upset and, in addition, go far to eliminate the present demand for more men. Hence the recent about-face towards this method on the part of many labor leaders.

But even if the wage earner is given


ENGINE VALVE COVER
NOTE 1: Parts to be machined to ±.002
NOTE 2: To be Aluminum Alloy 24S
NOTE 3: To be finished in accordance with Army and Navy Specifications AN-QQ-A-696-a
"What's meant by that?"

ALCOA HAS THE ANSWER

There are several Government-approved oxide-coated finishes for aluminum, which may be applied by the Alumilite* process. Each has its own identifying symbol and name. You'll certainly run across them in your war work, if you're making aluminum plane or instrument parts which require protective finishes.

Some of these finishes serve as base coatings for paint, providing surfaces to which the paint is highly adherent. All offer increased resistance to corrosion. Some look like uncoated aluminum. Some are colored or black.

If you are stymied by lack of information on Alumilite finishes—what their symbols and names mean, where the finishes should be used, how they are applied—get in touch with us.

Or, if you're puzzled with some question about aluminum alloys and their fabrication, come direct to us, too. Alcoa engineers have spent a lifetime finding the answers to just such questions. ALUMINUM COMPANY OF AMERICA, 2126 Gulf Building, Pittsburgh, Penna.

*Patented process

ALCOA ALUMINUM

MANPOWER WON'T SLIP

when greasy, oily floors are kept clean with

SPEEDI-DRI

Speedi-Dri is a unique, granular oil- and grease-absorbent for all kinds of floors. It cuts down the lost hours of irreplaceable working time by reducing falls and accidents to a minimum. By providing an immediate non-skid surface, Speedi-Dri allows employes to work faster and more confidently. It actually draws old stains and oil deposits out of steel, wood, and concrete floors, making expensive scrubbing quite unnecessary. Speedi-Dri costs less per square foot of floor kept clean than any other satisfactory method or product now in use.

Unlike sawdust, Speedi-Dri will not burn. It reduces accident and fire rates. In fact, insurance companies recommend its use, Speedi-Dri is harmless to floors of any kind, and prevents disintegration of shoes and other equipment by preventing contact with oil. Pound for pound, it excels all other substances in area of floor-space cleaned. It is available from your local distributor.

A generous sample will be sent on request. We urge you to investigate Speedi-Dri and its companion Sol-Speedi-Dri (for use where water soluble oils are used or where water is also present). There is only one —

SPEEDI·DRI

OIL AND GREASE ABSORBENT

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Philadelphia, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Menlo Park, Calif.

Prompt Service from Warehouse Stocks in Leading Cities

opportunity to earn more by producing more, will he make full use of it? "Earn more money—for what?" To buy a new spiffy car? A more resplendent radio? A bigger or a remodeled house? But are these worth the red tape and headaches now required to obtain them? Buy more War Bonds for more security when victory and peace bring confusion and the possibility of joblessness? Yes, to be sure. But for results he must wait until next year or year after next. Meanwhile, the tug of a 4-lb. bass would be positively thrilling *day after tomorrow!* In spite of all the pending union demands for higher hourly rates, today's absentees indicate that the worker's wish for more money has lost much of its drive now that his dollars cannot be turned into satisfactions easily and immediately buyable.

Similarly the war has reshuffled out the factory window that other incentive so long relied upon as a sure-fire compeller of a certain minimum of productive effort. I mean the worker's fear of discharge. ("Fire me? Okay, I'll get a better job tomorrow.")

What remains? A few work-or-fight laws? Hardly, at least not until every alternative has been tried.

Oddly enough, the alternative still lacking proper trial is precisely the one which at this moment makes our soldier boys glad to spill their blood on our fighting fronts. It is called by many names—the wish, the willingness to pay the price even of life itself, for self-respect, for recognition, for honor, for the certification of one's right to believe in himself and his importance.

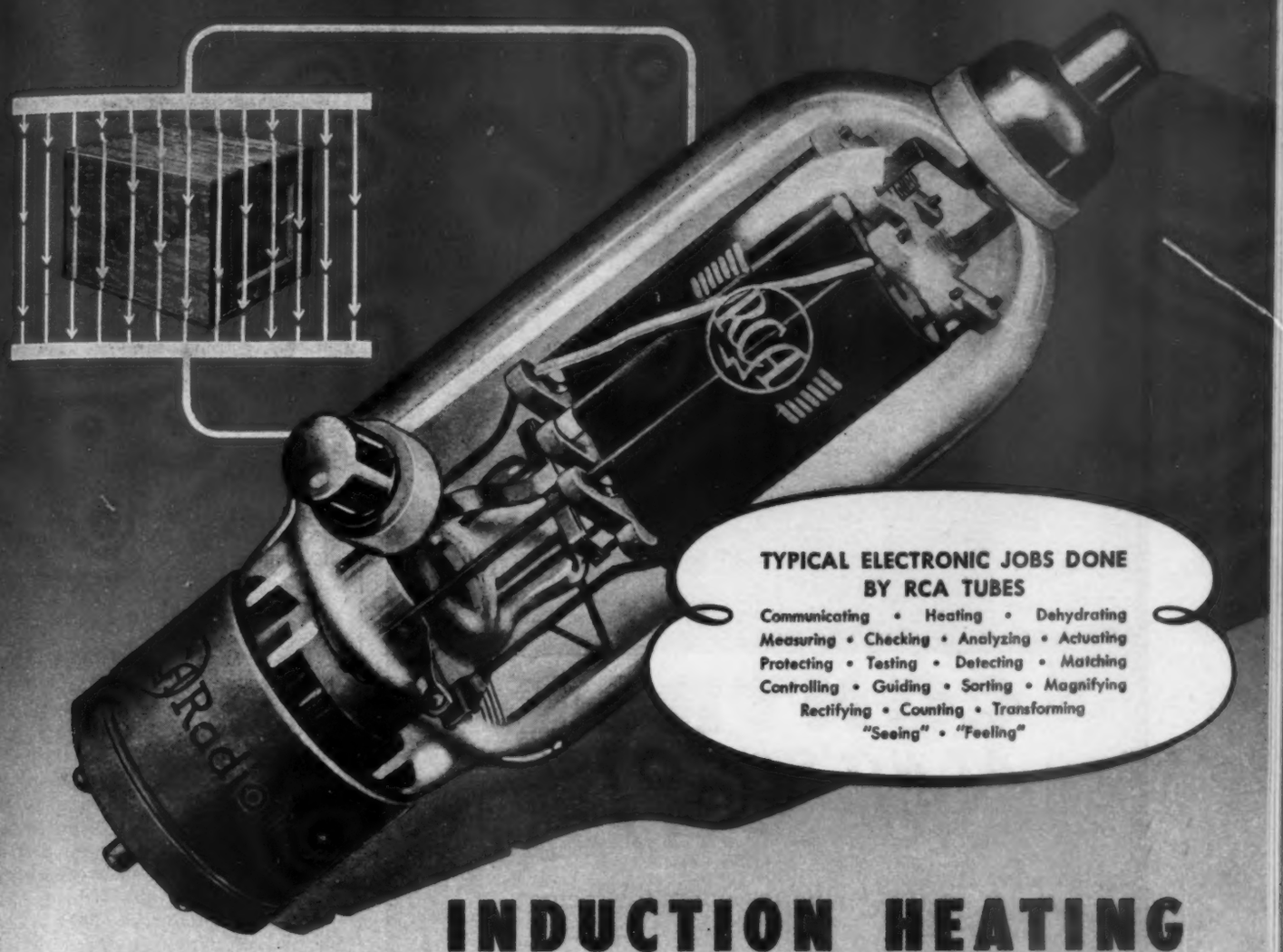
A Higher Rung

One way of using this is to demonstrate to every member of the working force that a higher rung on the job ladder awaits the worthiest. Even in normal times the worker's wish to raise his social status is at least two-thirds as strong a spur as his wish to earn. Yet few employers give to their promotion ladder anything like two-thirds as much attention as to their wage system.

Another way is for Mr. Employer to reward the exceptional performance of every individual and group in his plant with much the same recognition and honor as does every military unit. To do this he must somehow contrive to convince every fellow-worker of the war-winning importance of every department, every machine, every process. ("Explain, explain. If you can't explain, explain why you can't explain!")

Luckily, this conviction grows easier with every day that more and more families contribute some member to

DO THINGS BETTER, FASTER, MORE ACCURATELY—*THE ELECTRONIC WAY*



TYPICAL ELECTRONIC JOBS DONE BY RCA TUBES

Communicating • Heating • Dehydrating
Measuring • Checking • Analyzing • Actuating
Protecting • Testing • Detecting • Matching
Controlling • Guiding • Sorting • Magnifying
Rectifying • Counting • Transforming
"Seeing" • "Feeling"

INDUCTION HEATING

...the electronic answer to many industrial problems

High on the list of Electronic developments that have seen tremendous expansion under impetus of war requirements is Induction Heating.

This Electronic method has meant important savings in time and cost on jobs ranging from case hardening, annealing, riveting, and tin-plating, to food dehydration, plywood glueing and others. It has meant better heat control and greater uniformity. It has meant simplified handling of materials to be treated—and much more.

Here, as in other phases of Electronic development, the radio tube is the "magic brain" of the process—and the fountainhead of modern tube development and production is RCA.

Made in varied lines for almost any Electronic application, RCA tubes afford a broad engineering selection of types, each with a background of proved performance that assures long life, utmost dependability, and high efficiency.

In the Electronics of the future, as in the Radio of today, RCA Tube engineering will continue to lead the way—*all the way!*

RADIO CORPORATION OF AMERICA

RCA Victor Division, Camden, N. J.

RCA TUBE PUBLICATIONS

Following are a few of the Tube publications available from RCA Commercial Engineering Section, 416 South Fifth St., Harrison, N. J.:

RCA TRANSMITTING (Power) TUBE GUIDE . . . 72 pages of data and circuits for popular RCA Power Tubes, U-H-F Acorn and Midget types, Gas-triodes, and Gas-tetrodes. Single copy, 35c.

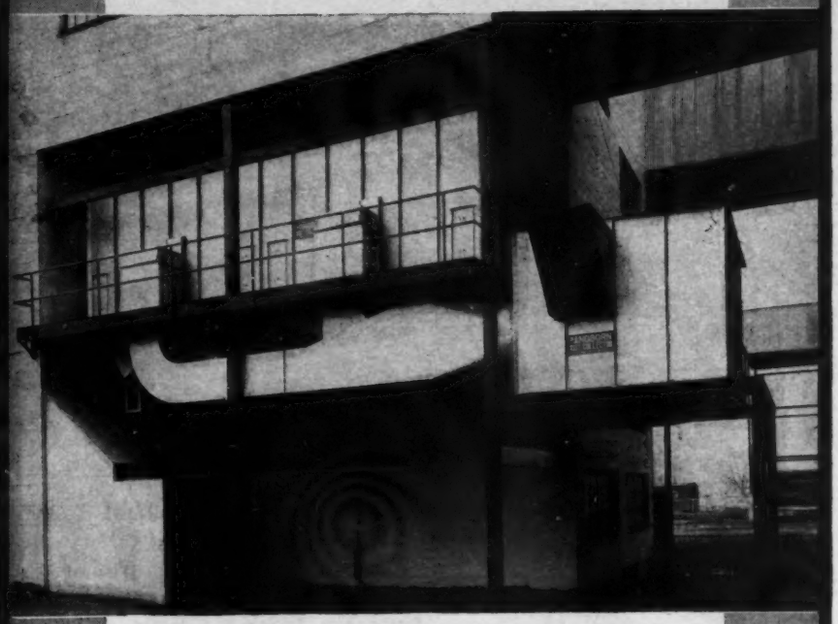
TT-100 TRANSMITTING AND SPECIAL-PURPOSE TUBES BULLETIN . . . Illustrated catalogue information on RCA air- and water-cooled transmitting tubes, rectifiers, television tubes, voltage regulators, and special amplifiers. Single copy, no charge.

RCA PHOTOTUBE BOOKLET . . . Provides a clear understanding of theory, construction, and operation. Single copy, no charge.

RCA RADIO-ELECTRONIC TUBES

High-vacuum, gas, and vapor tubes • Voltage amplifiers • Low-power and medium-power tubes • Cathode-ray tubes • Rectifiers • Voltage regulators • Relay tubes

DUST



CONTROL
AT NO SACRIFICE OF SPACE

• The hidden ingredient in the recipe for effective industrial dust control is EXPERIENCE.

• Pangborn engineers—working for all classes of industry—in field surveys and analysis—design and recommendation—production and installation—test and operation—know many short cuts to the economical solutions of annoying dust problems. • Note how they utilized waste space in a building recess for the erection of this clean-cut installation. They can do an equally good job for you, too. Write today for new Bulletin 909.

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

the fighting forces. Every day, also, the public relations departments of Army, Navy, Marines, and Coast Guard indicate greater willingness to help every employer by sending into his plant from the battle fronts an abundance of speakers, films, recordings, messages, trophies, bullet-riddled products, and what not.

If he lacks a plant paper, Mr. Manager can well consider establishing one. Besides facilitating the needed explanation, it has the advantage of bringing into the war-plant circle the worker's wife and family—the same wife and family that now so fully feel themselves associate members of the fighting lines. Still further, the plant paper—or, in the smaller communities, the local newspaper—makes this enlarged factory and family home front into a kind of grandstand, an organized arena for applauding the war exploits (or, if necessary, stigmatizing the failures) of its members.

Appeal to Pride

To be sure, most plant editors appear to give their entire attention to their readers' domestic, social, and other off-the-job doings, and so muff the opportunity furnished by the crisis to make proper use of the worker's inherent hankering to take pride in himself by enjoying pride of company and pride of job. But this need not deter the manager who has learned that, to enjoy such pride, the home-front producer stands as ready as his battle-front brother to do the impossible, *provided* he is convinced that his super-efforts will not go unappreciated.

Of course, the plant paper, the rallies, celebrations, and what not will fail to secure the needed conviction unless their message is supported by incentive-minded bosses all down the line to the last gang leader and jobsetter. Nor can these bosses persuade their people to do the impossible simply by suddenly commencing to hand out compliments; if compliments are given for sloppy effort, no worker but loses respect for the givers. Fact is, the wish for approval and importance is so strong a motivator that it deserves the name of "human dynamite"—to be used as carefully as regular dynamite, but certainly to be used.

Now that both the wish for the dollar and the fear of the quit-slip have lost so much of their ancient punch, what else is there except to recall the words of old Evan Pugh, the Rhondda repairman:

"Every mon do know that for a kindly word 'e'll work 'is bloody guts

40-year old building made ready for many more years of low-cost operation by replacing worn-out sash with INSULUX panels. In center of panels are block with smooth interior and exterior faces for limited vision.

FIXED FOR LIFE . . with INSULUX Glass Block Panels

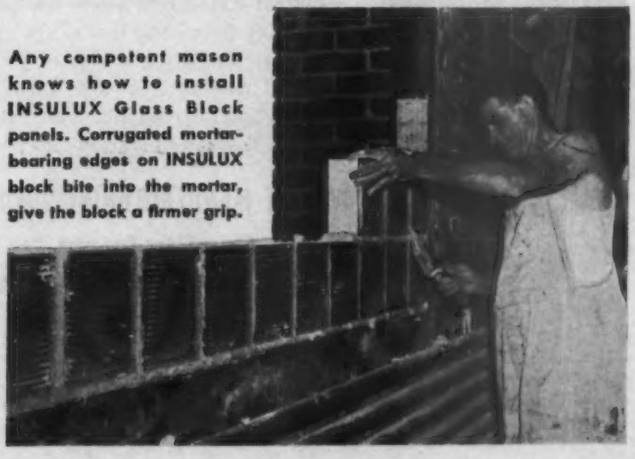
INSULUX *Light-Directional* Block distribute diffused daylight evenly throughout interiors, cut power costs. Note daylight reflected from painted ceilings. INSULUX guards against infiltration, makes housekeeping easy.

Old buildings modernized today with INSULUX Glass Block are set for a lifetime of efficient operation.

INSULUX panels are *permanent* replacements for worn-out windows. They afford *controlled* daylighting—diffused, directed and distributed where it is used to best advantage. Their four-inch hollow glass-block wall construction effects substantial savings in initial and operating costs of air conditioning and heating equipment. INSULUX guards against dust, dirt, and moisture infiltration.

INSULUX Glass Block are available for immediate delivery today—at *prewar* prices. Installation is simple and fast—requires little or no metal. Maintenance costs are extremely low.

Get in touch with your local INSULUX distributor, or write us today, for construction details showing how INSULUX can replace worn-out sash in *your* building. INSULUX Products Division, Dept. 88, Owens-Illinois Glass Company, Toledo, Ohio.

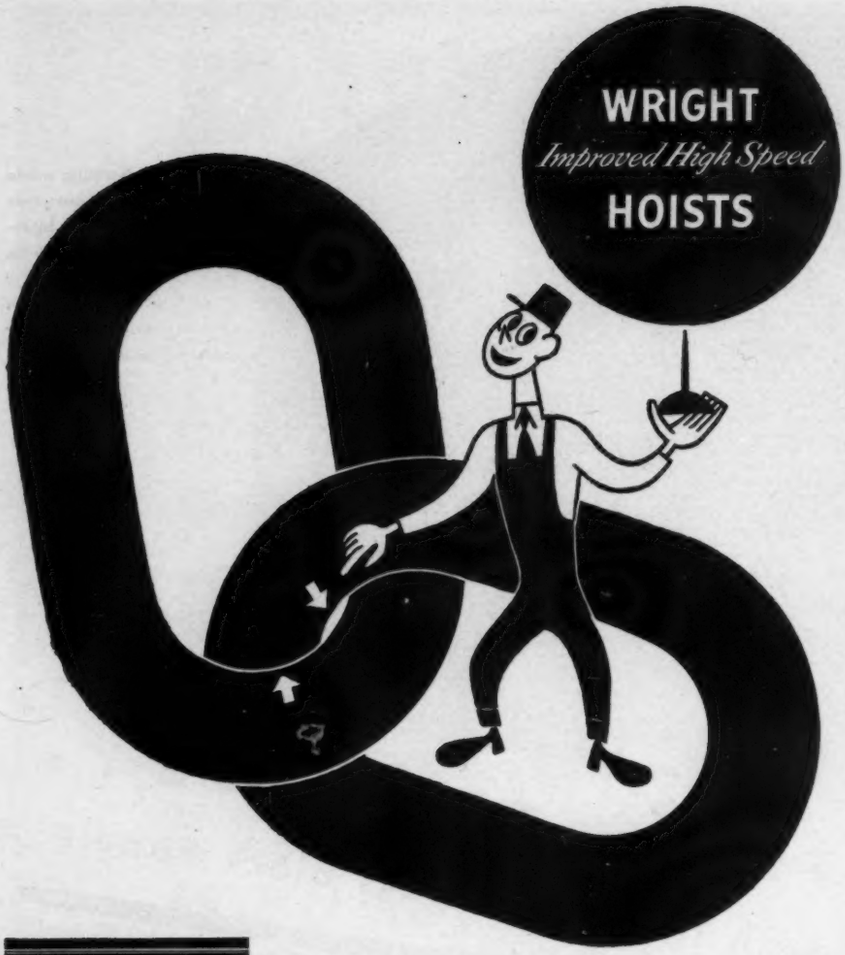


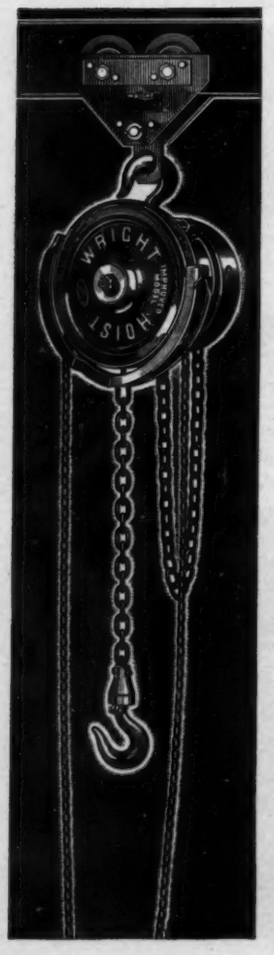
Any competent mason knows how to install INSULUX Glass Block panels. Corrugated mortar-bearing edges on INSULUX block bite into the mortar, give the block a firmer grip.

OWENS-ILLINOIS

INSULUX

GLASS BLOCK





Buy your load chain a drink!

Believe it or not, mister, a well-lubricated load chain will outlast a dry chain **fifteen times.** That sounds incredible, but it's true. You see, every link has a bearing area where it meets its neighboring links. Unless there is a protecting film of oil at these points, the friction will cause undue wear. Another place where the protection of oil is needed is when the chain comes in contact with the load wheel.

. . . But let's go back to the chain itself. A dry chain wears prematurely—lengthens itself out of pitch. And a chain out of pitch cannot seat itself properly in the wheel sockets. Another vicious result of wear.

. . . So please—now that all steel products are critical—lubricate your load chain regularly and make it last; twice, five times, ten times, yes—**fifteen times** as long.

Send today for a free copy of the Wright Crane Signal Chart. This chart (36″ x 24″) can be tacked up on the bulletin board to teach the men standard crane signals which will speed operation and promote safety.

WRIGHT MANUFACTURING DIVISION
York, Pa., Chicago, San Francisco, New York
AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

In Business for Your Safety

out . . . Every mon moost 'awve a chawnce 'ere on the job to show 'imself the mon."

If Evan was ever right, he certainly is today.

One morning I asked him how I could get out of the mine in case I got lost from him.

" 'Tis easy thot," he answered. "All ye need to do is to keep a-walkin' alwuz with the air a-blowin' on your face."

In most mines, the pit's big fans push a huge volume of fresh air down the central shaft and from there out to the working place of every miner. To walk against the air means that one is walking toward the safety of the center.

We Americans are confused because at one and the same moment we are appealed to for the unities of national victory and also for the distrusts and disunities of class rivalry and social revolution. So we have forgotten that our boys in the Solomons and North Africa daily move, and move gladly, into the enemy's deadly fire because, and only because, as they move they feel a-blowing on their faces the air of our appreciation of the nobility that makes them do it.

The job of those responsible for victory on our assembly lines is to find ways of persuading our soldiers on the production front to sweat as willingly as our soldiers now bleed on the fighting front. One way, certainly, is to bring to bear, to the extent now favored by the crisis, the spiritual force of similar incentives.

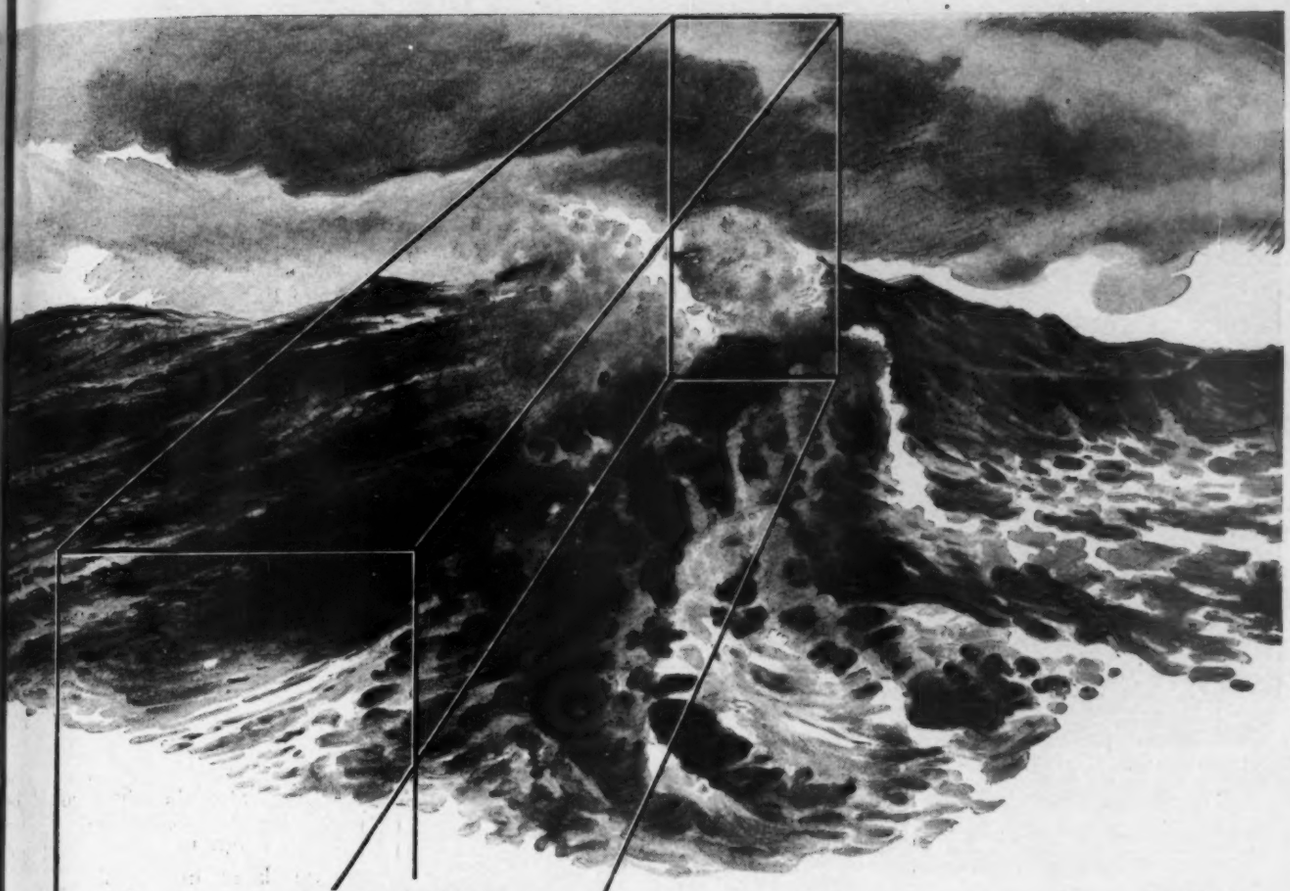
Quick Course for Foremen

(*Continued from page* 115)

tried to improve, and sincere, honest effort nearly always results in improvement. It has, also, a helpful effect on others who observe this effort. It becomes contagious.

A third result was the improved relationship between management and supervision. Each group was brought to a better understanding of the problems of the other. Discussions "cleared the atmosphere" and supplied facts instead of rumors or guesses.

A fourth result was the realization by the persons in the program that management was a part of the program. It was a helpful influence to know that management was taking criticism, and trying to do a better job. It was helpful to have it known that there was a regular weekly management meeting, and that it required extra effort by management to attend it. It helped to have it known that



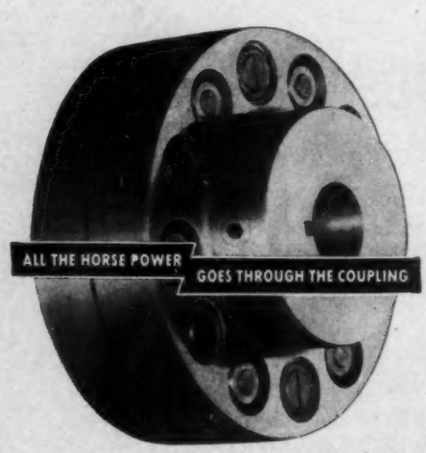
THE BRICK THAT SAVED A THOUSAND SHIPS

Dehydrated food saves shipping space.
Compressed dehydrated food briquettes
Save still more space.
Thus, one supply ship can now carry
The food equivalent of ten supply ships . . .
And each ship can provision ten times
As many soldiers as ever before.
Air conditioning and refrigeration equipment
Makes possible these dehydrated food bricks . . .
Dependable and efficient cooling equipment
Provided by General Electric. After the war,
When air conditioning and refrigeration
Will again become available to the public,
Take advantage of G-E experience
In the fields of air conditioning and
Commercial and industrial refrigeration . . .
Turn to General Electric.
Air Conditioning and Commercial
Refrigeration Department, Division 435,
General Electric Co., Bloomfield, N. J.

Air Conditioning by **GENERAL ELECTRIC**

Try to hold two pencils in perfect end-to-end alignment without touching each other, while you count ten!

Even if you brace your hands, wrists or arms as solidly as you can, you will quickly see why Ajax FLEXIBLE Couplings are essential to protect direct-connected machines from unavoidable misalignment.



Remember, too, that you are making this test with pencils weighing only an ounce or two . . . instead of costly machines driven twenty-four hours a day at high speeds by plenty of horsepower!

Manufacturing executives, design engineers, plant superintendents, and maintenance men are invited to write for the Inside Story of Ajax Flexible Couplings.

AJAX

FLEXIBLE COUPLING CO.

WESTFIELD, N. Y. **Incorporated 1920**

management had accepted extra duties and responsibilities, specifically with reference to checking the assignments turned in every week by more than 200 persons. It would require several pages to record the favorable comments of employees when they learned that management was required to live by its own rules.

Commenting upon the anticipated results of the program, it was not expected that any miracle would be wrought. It was not expected that tremendous improvement in quality and quantity of production would occur immediately. In a large organization, changes of any kind come slowly.

Successful Effort

As the program ended, there seemed to be a unanimous feeling that it had been more successful than any preceding one. There was tangible evidence to support this belief, such as better individual performance and better teamwork, and here and there better departmental performance. But there was also a realization that the greatest benefits would be reserved for the weeks and months ahead, after the lessons learned had been translated into habits.

It seems proper here to review the features of the program that we believe were responsible for its success, even though they may have been referred to earlier in the article. The first was the intensity of the program. It was more than a weekly meeting, to be forgotten as soon as the participants were out of the room. In this program there were daily reminders by superiors, by fellow-members, and by myself. The written assignments and the private interviews contributed to the intensity. It was "in the air," a topic of daily conversation.

A second feature was the written assignment. This required from one to several hours of thinking and effort on the part of every participant. In many cases the assignment required the person to obtain help in its preparation. Such effort could hardly fail to develop the mental stature of the individual.

A third feature was the private interview with more than one-half of the participants. These personal and private talks offered an opportunity that could not be found in any other way, to get down to cases regarding individual traits. In these interviews, sincerity, honesty, and frankness were evident throughout. To add to their effectiveness, I often acted as a go-between to help iron out difficult and irritating situations. A number of persons thought this feature the best of the entire program.

Significant Labor Developments

(Continued from page 116)

of that law. (Walling vs. Shenandoah Owens Mining Company.)

Held Under Act

Company's logging operations though confined to one state and its lumber was wholly grown, cut, and delivered to purchasers within the state. (Strike would curtail substantial interstate operations of its two principal customers.) (Cleveland-Cliffs Iron Co.)

Held Not Under the Act

Cement finisher using materials that came from outside the state, since interstate movement ended when the materials were unconditionally delivered to the contractor at the building site. (Barbe vs. Cummins Construction Company.)

Watchman engaged to reduce insurance rates, since his occupation was not necessary to the production of the commodity (lumber) for interstate commerce. (Southern Package Corporation vs. Walton.)

Stock boys in a warehouse owned and used by their employer for the storage of merchandise obtained from outside the state for sale by his own local retail stores. (Walling vs. L. Wieman Company.)

Employment of Minors

Children's Bureau ruled that minimum age of 18 should prevail for employment of minors in all occupations in which exposure to excessive concentration of chlorinated solvents is possible.

Records to Be Kept

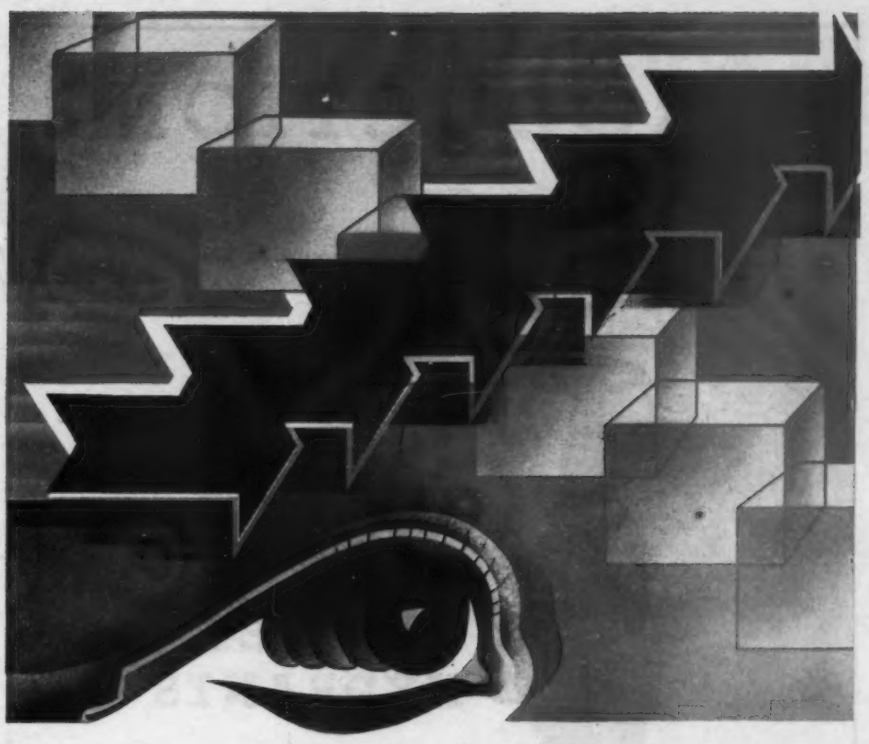
Any contractor on a government contract must keep records of injury-frequency rate for a period of four years. (Order of Secretary of Labor.)

Anti-Kickback Act Not Applicable to Foremen

The Anti-Kickback Act applies only to a situation where an employee rebates a portion of his wages to his employer or one acting in his behalf; not to a foreman who compelled such kickbacks without the knowledge or approval of the employer. Since the statute is penal, the court ruled, it should be strictly interpreted and not extend beyond the original intention of the Act. (U. S. vs. Laudani.)

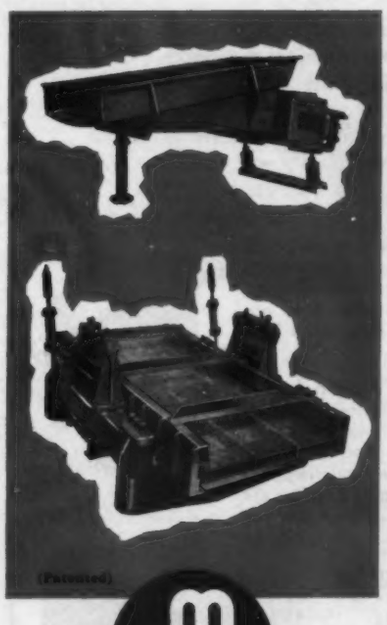
Ordinance Invalidated

A municipal ordinance banning the public collection of union dues or



MOVING WITHOUT VISUAL MOTION

Nothing Moves but the Material



Watch a Jeffrey-Traylor Vibrator work . . . you see a smooth-flowing stream of material moving steadily forward, uphill or down, while the deck of the machine remains visually motionless.

The advantages of the electric vibrating principle for batching, conveying, cooling, drying, feeding, proportioning, screening, sizing, packing or weighing are as diversified as the industries which they serve. The applications are almost limitless.

Ores, sinters, foodstuffs, powders, chemicals . . . can be handled efficiently and economically through various processing operations.

Perhaps there's a vibrating unit already built for your needs—if not, Jeffrey can design the equipment which will best serve your plant.

JEFFREY-TRAYLOR DIVISION

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

911-99 North Fourth St., Columbus, Ohio

SALES OFFICES: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City

PRODUCTION
and
PROTECTION

VALVES
HYDRANTS
and
PIPE LINE
ACCESSORIES

The high quality and dependability of M & H products play an important part maintaining maximum production of war materials in many manufacturing plants. M & H products are equally important for adequate protection of plants and factories against the increased fire hazard of war emergencies. A reserve supply is good insurance.

M & H GATE VALVES are cast iron body, bronze mounted, with double-disc parallel seat or solid wedge top, non-rising stem or outside screw yoke. They come either with flanged or screwed connections. Valves for fire protection lines are approved by both the Underwriters and the Associated Factory Mutuals.

M & H FIRE HYDRANTS are revolving head, dry top, bronze mounted. They also are approved by Underwriters and Associated Factory Mutuals. Entire main valve assembly is removable through barrel without digging. Special Traffic Model is fitted with breakable bolts and stem coupling, designed to break at ground line under impact. Repairs are made simply by renewing bolts and coupling without shutting off the water.

M & H PRODUCTS INCLUDE

FIRE HYDRANTS	SHEAR GATES
GATE VALVES	MUD VALVES
TAPPING VALVES	VALVE BOXES
WALL CASTINGS	FLAP VALVES
SPECIAL CASTINGS	SLUDGE SHOES
TAPPING SLEEVES	FLANGE AND FLARE FITTINGS
CHECK VALVES	FLANGED FITTINGS
FLOOR STANDS	B & S FITTINGS
EXTENSION STEMS	
CUTTING-IN TEES	

M & H VALVE
AND FITTINGS COMPANY
ANNISTON, ALABAMA

initiation fees was held unconstitutional as violating the fundamental rights of workers to organize. (Pittman vs. Nix.)

Labor Laws Relaxed

Limitations on hours for women were lifted by Indiana, Wyoming, and New Hampshire. Indiana and New York now permit greater utilization of child labor in industry and agriculture.

WAR LABOR BOARD

**WLB Defers to NLRB*

While WLB has assumed broad jurisdiction over all industries, not merely those engaged in war production, it has refused to consider the scope of the bargaining unit until the parties have exhausted existing procedure under the Wagner Act. Accordingly, the union's request that a bargaining unit be extended to newly established plants, differently designated in an effort to exclude them from the bargaining unit, is a matter for NLRB not WLB. (Remington Rand, Inc.)

**Wage Stabilization Rulings*

WLB permits modification of certain existing wage classification schedules as follows:

1. Failure to pay a "fixed amount" or a percentage bonus during the current bonus year would be a wage reduction requiring approval, if the bonus, either by agreement or custom and practice, is considered an integral part of the employee's wage or salary.

2. Where the earnings of an employee paid on a commission basis have have decreased because of lower sales, a bonus may be paid to make up the difference without prior approval.

3. An increase in piece rates may be made without prior approval to permit employees to earn the same income as before, where the employees' earnings have decreased because of the use of inferior or antiquated machinery.

Approval is not required if the payments are computed at rates fixed by (1) a salary agreement or salary-rate schedule in effect October 3, 1942, or approved by the Commissioner thereafter, or (2) by the settled practice of the employer over a period of at least two years.

A bonus may be paid without prior approval only if (1) based on the individual employee's sales or other transactions, or (2) calculated at a fixed percentage of the individual employee's salary. In either case the rate determining the amount to be paid

* In this and the following classification items marked with an asterisk also are considered to be trend indicators.

"Tomorrow may be too late—do it today!"...CHECK UP!

THIS

ELECTRICAL FAILURE HALTS WAR PRODUCTION

MIGHT HAVE PREVENTED

THIS

WARTIME restrictions make copper products hard to get — this includes electrical wire and cable. It will pay you to protect what you have.

Anaconda's Preventive Maintenance Plan will help you check to see that cables in your plant are not being abused.

If you follow this free plan you not only help yourself, but more important, you help the war effort. This manual provides a practical automatic method for complete analysis of circuits and equipment... uncovers potential weaknesses ... methods for correcting them... with charts to enable quick periodic check-ups.

NOTE: Through this Preventive Maintenance Plan you may uncover the evidence necessary to obtain an "emergency repair priority." This is explained fully in the plan book.

48227

ANACONDA'S PREVENTIVE MAINTENANCE PLAN

Anaconda Wire & Cable Company
25 Broadway, New York City

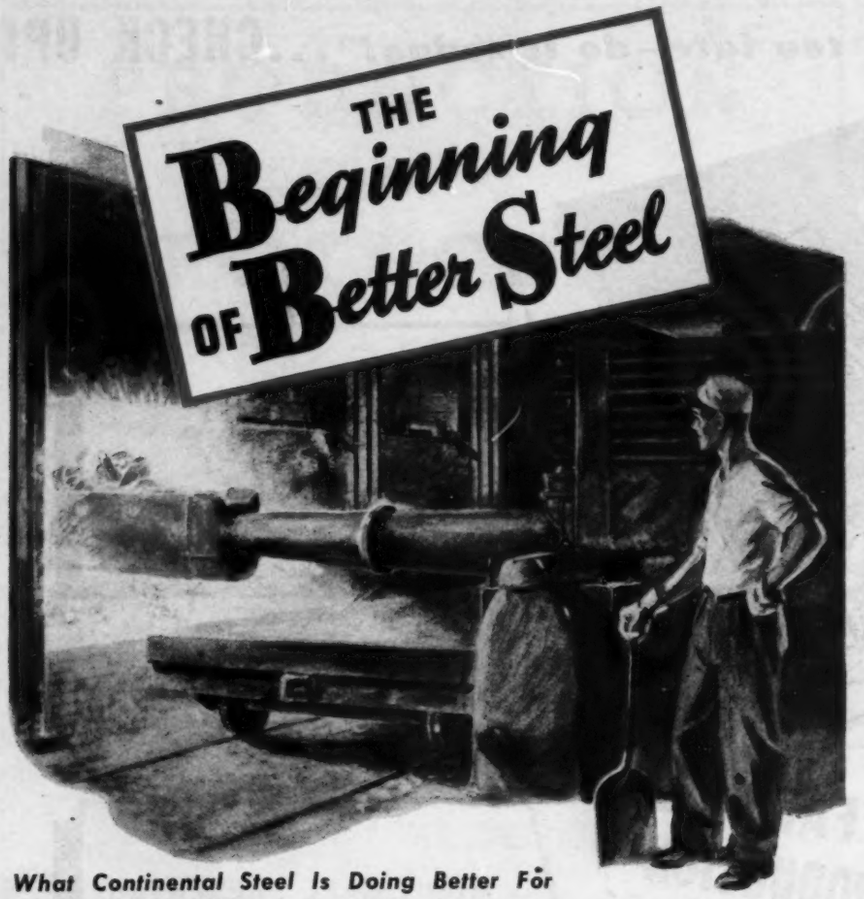
Please send copy of the Anaconda Preventive Maintenance Plan for safeguarding production.

Individual .....

Company .....

Address ..... City .....

5-R



What Continental Steel Is Doing Better For War Today, It Will Do Better For You Tomorrow

The pressure of war demand for high quality steel is emphasizing the importance of scrap. To the layman scrap may mean a short cut in steel making; but to the metallurgist scrap is the secret of quality control. Sorting scrap by scientific selection enables the Continental Steel Corporation to control the properties of its open hearth steel to a precision not practical in any other way.

Continental has always specialized in the production of open hearth steel of special analysis for sheets and wire. This experience now means better steels for war. Tomorrow, it can mean better steel for you.

Remember, one ton of your idle scrap makes two tons of fighting steel. Search your plant again and again.

CONTINENTAL STEEL CORP. Kokomo, Ind.

(The Superior Sheet Steel Company, Canton, Ohio—a subsidiary)

CONTINENTAL STEEL CORPORATION ★ SUPERIOR STEEL SHEETS

CONTINENTAL STEEL CORP. TRADE MARK CHECKER COAT REG. U.S. PAT. OFF. KOKOMO, IND.

CONTINENTAL STEEL CORP. STEEL Lead-sealed SHEETS KOKOMO, IND.

CONTINENTAL SUPERIOR STEEL

SUPERIOR

CONTINENTAL STEEL CORPORATION

must be fixed by a salary agreement or rate schedule in effect October 3 1942, or thereafter approved, or th settled practice of the employer over a period of at least two years.

**Stabilization*

Disguised increases will not be allowed whether through reduction in hours or increased allowance for vacation. (Oliver Farm Equipment Company Pepperell Manufacturing Company.)

**Little Steel Formula Reaffirmed*

WLB denied cost-of-living adjustment under an escalator clause on the ground that it would bring the rates above the 15 per cent limit permitted by the Little Steel formula, and that the differences between the rates paid and those of competing plants in the area did not constitute an inequality.

Escalator clauses will only justify wage increase when they conflict with the Stabilization Program. (American Home Products Company; Uptown Metal Shops; Vulcan Iron Works. Disapproved—White Motor Company.)

**Increase Above Little Steel Formula Allowed*

Although prior increases exceeded 15 percent, WLB ordered an increase in rates to the level of those paid at comparable unionized plants in the region. Unionized, not non-unionized plants, should constitute the "norm." (Independent Iron Works.)

**Work Guarantee Required*

WLB requires a minimum guarantee of eight weeks' work when an employee, laid off for economic reasons, is recalled from another war job to which he had gone. For want of such guarantee the employee may refuse to return without loss of his seniority rights. (Aluminum Goods Manufacturing Company.)

**Union Security Granted*

WLB refused to penalize a union for striking, when it found the officials were men of integrity and good will. The penalizing formula was not to be mechanically applied when another remedy was required. (Art Metal Construction Company.)

The mere existence of a strike was not sufficient to deter WLB from granting a maintenance-of-membership clause. The grant of union security is made dependent upon the responsibility of the union. A brief strike, which was designated as a spontaneous demonstration, was not sufficient justification for denial of maintenance-of-membership clause. (Babcock & Wilcox Tube Company.)

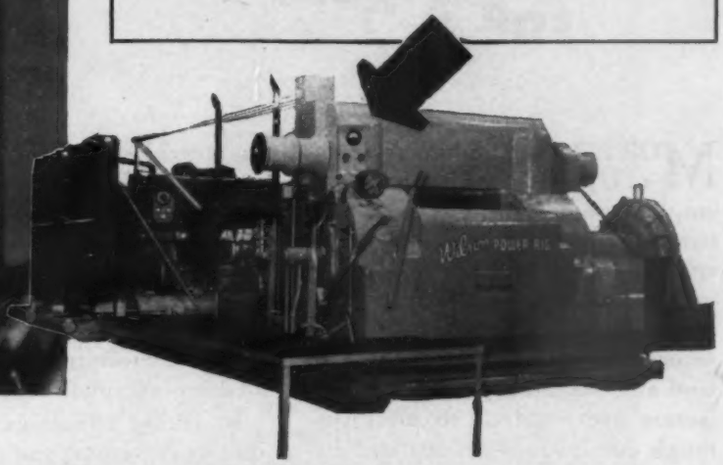
Where the Board recognized that

HERE'S HOW TO BE SURE OF

Production Control

REGARDLESS OF WHAT YOU'RE PRODUCING!

These Amazing Instruments Measure Any Performance Related to a Rotating Shaft!



Stewart-Warner Industrial Tachometers

PROVIDE A CONTINUOUS ACCURATE PICTURE OF EACH MACHINE'S WORK

STEWART-WARNER Industrial Tachometers included as standard equipment on any new machine provide ample evidence that the manufacturer has full confidence in his product. He knows what it will do, and he wants the purchaser to know. So he furnishes an instrument that provides a constant check on performance. That's *production control,* needed now more than ever!

But if machines in your plant are not so equipped, it's easy to add a Stewart-Warner Tachometer to make sure of production control on any machine where output is in direct proportion to shaft rotation. This knowledge is essential to accurate cost records. It is vitally important in meeting schedules—whether you're printing books, wrapping packages, or bottling a beverage.

Take action now to give your foremen, your superintendent, your cost department, the unmatched advantages of production control. Mail the coupon today.

STEWART-WARNER

INDUSTRIAL TACHOMETERS

Another Product of STEWART WARNER

1870 DIVERSEY PARKWAY
CHICAGO, ILLINOIS

STEWART-WARNER CORPORATION
1870 Diversey Parkway, Chicago, Illinois

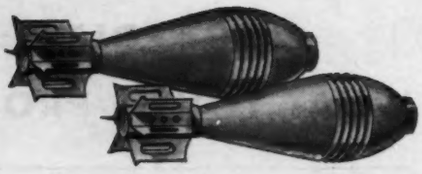
Please send me complete information about PRODUCTION CONTROL with Stewart-Warner Industrial Tachometers.

Name.....

Address.....

City..... *State*.....

Firm Name.....



VITAMINS FOR A HUNGRY MORTAR

MORTARS are important items of U. S. equipment—in Pacific jungles—on desert sands. But mortars without shells are useless—and mortar shells today, in common with many other supplies to the U. S. armed forces, must travel safely and securely over thousands of miles of land and sea. Strong, durable containers are required to meet the tough conditions—necessitated by speed-up requirements of war.

Mortar shells and other war shipments are reaching the fighting fronts all over the world in General Boxes. Consequently, General Box engineers have gained wide experience and a thorough knowledge of requirements for war products containers. In designing and manufacturing strong, space-saving containers they have co-operated with manufacturers in many industries. They are thoroughly familiar with *all* shipping container requirements.

By taking advantage of General Box's experience, you may be able to solve your shipping container problems quickly . . . and find out which of the allowable alternates is most practical for your products. Write us.

For manufacturers of war products: General Heavy Duty Wire-Bound and Nailed Wooden BOXES and CRATES
For Domestic Service: Corrugated BOXES and Wood Cleated Fibreboard CRATES
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GENERAL BOX COMPANY

GENERAL OFFICES: 504 North Dearborn Street, Chicago, Illinois
DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon; Continental Box Company, Inc.: Houston, Dallas.

the legitimate objectives of the union were exceedingly difficult to attain because of the longstanding tradition in the company, and the union favoring an open shop, WLB granted a partially retroactive maintenance-of-membership clause. (Remington Rand.)

WLB granted a union maintenance clause without an escape period, even though the union sponsored a strike under the "misunderstanding" that this was essential to procure certification of the dispute to the Board. (Celanese Corporation.)

In another case, the clause was granted conditionally pending the avoidance of future strikes. (Semet-Solvay Corporation.)

However, for the mere threat of a strike WLB would not withhold union security. (Gallion Iron Works & Manufacturing Company.)

Where the union struck twice, first for dismissal of an employee, and subsequently for dismissal following reinstatement ordered by NLRB, the union's irresponsibility was sufficient to justify WLB's withholding of union security. (Borg Warner Corporation.)

**Union Security Restored*

WLB restored to a union the maintenance-of-membership clause after a period of probation, but not retroactively despite the considerable loss of members to the union. (Monsanto Chemical Company.)

WLB's liberality in this matter is further evidenced by granting such security to meet a threat at the union which arose from the flux of membership. (Harshaw Chemical Company.)

NATIONAL LABOR RELATIONS BOARD

**Jurisdiction*

NLRB refused to decide a dispute over the meaning of a collective bargaining contract until the regular procedure for determining such issues had been exhausted.

However, if the employer's conduct amounted to an unfair labor practice, the union could press the case before the NLRB or before the WLB if impairment of war production were threatened. (Consolidated Aircraft.)

Dispute which is subject to the jurisdiction of the NLRB need not be submitted to arbitration under state law. (Benedict.)

**Control of Picketing*

A New York Court ruled that peaceful picketing with unfair signs aimed at retaliating against a rival union may be enjoined. Normally management may not enjoin picketing because a labor dispute is involved. New York

Will Peace Come In Our Time?

Most certainly it will—and sooner than you may expect. With it will come the crucial test of whether or not American industry can convert as efficiently to peace as it has to war. From our extensive relations with hundreds of varied manufacturers we know of scores of amazing new products that only await the message of peace to come into being. Everyone looking ahead to that great day can even now count on the assistance of the Weatherhead plants which are producing vital parts for planes, tanks, ships, cars and trucks at the rate of *millions every day!*

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries

Plants: Cleveland, Columbia City, Ind., Los Angeles
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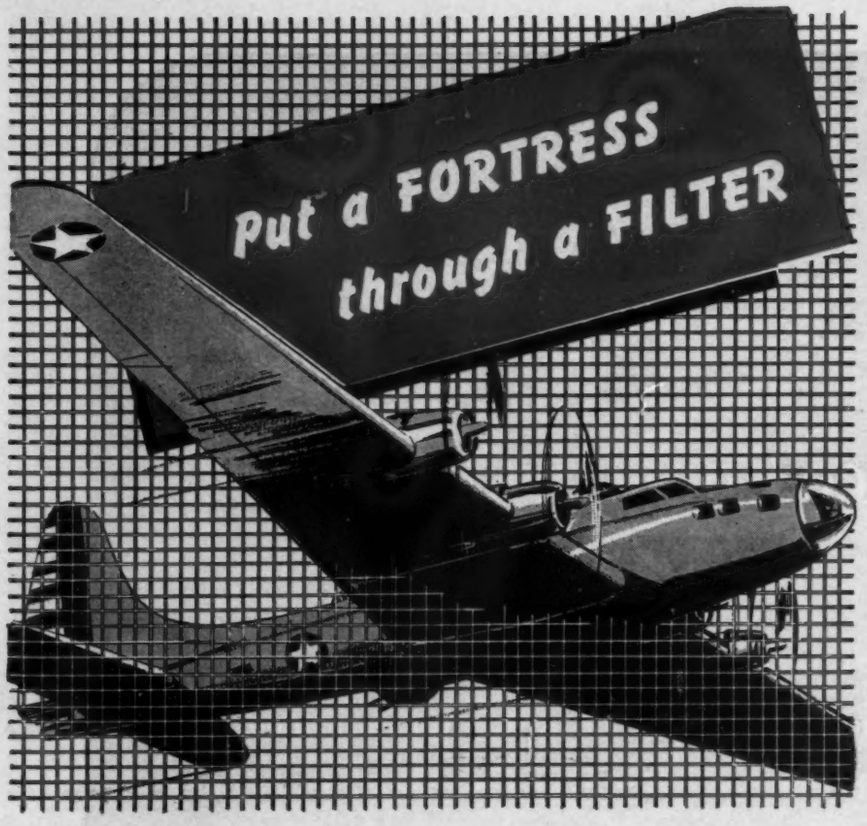

THOSE FLYING FORTRESSES of ours have proved they're darned good ships—on daring daylight sweeps over Europe — in night attacks on Rhineland arsenals — in mast-high skip-bombing of Japanese convoys in the South Pacific. Those "Flaming Mamies" and "Kokomo Kids" didn't get that good just by accident. They're designed and built and flown by darned good men—with darned good materials.

Helping to make those materials good—and to *keep* them that way—is one of the war jobs of Roebling Wire Screens. Right at the very beginning, for example, coarse screens grade and sift crushed bauxite for aluminum production, crushed ore and coke and limestone for iron that will become steel engine parts . . . Fine screens serve as filters to turn out the gas that makes those engines purr—and serve again as filters in the Fortress's own fuel and oil lines to keep those engines happy!

Yes, those Fortresses and other American planes are *good*—and Roebling Wire Screens are part of the production force that makes them that way! Roebling Wire Screens from one-inch rod stock down to *one-thousandth*-inch wire, in steel, brass, copper, phosphor bronze, stainless, monel, aluminum — *you* name it — are available promptly to makers of essential products. Whether you're putting a bomber's raw materials through a filter or protecting machine parts from dust and damage, Roebling's got what you need in wire screens.

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TRENTON, NEW JERSEY
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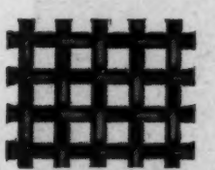
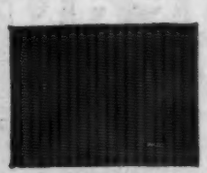
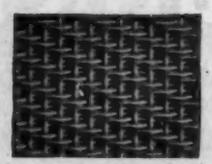

OBLONG OR SQUARE MESH WIRE CLOTH


DUTCH PLAIN WEAVE FILTER CLOTH


DUTCH TWILLED WEAVE FILTER CLOTH

ROEBLING
WOVEN WIRE SCREENS
JAR ROEBLING

has recently taken the position that such picketing may be enjoined in certain situations—i.e., where there is violence or threats of irreparable damage to an innocent employer. (Dinny Robins vs. Davis.)

**Held Not Unfair Practice*

Refusal to reduce to writing a closed-shop provision which he accepted on a day-to-day basis, because of a jurisdictional dispute. (Acme Breweries.)

**Must a Union Contract Be Reduced to Writing?*

Generally it has been held that refusal to reduce a contract to writing is evidence of bad faith and constitutes a violation of the Wagner Act (i.e., a refusal to bargain collectively).

However, there may be mitigating circumstances. Such was the case when the employer refused to embody in an agreement for a definite time, a closed-shop provision which he was willing to accept on a day-to-day basis, since he relied on good faith in a jurisdictional strike. In view of the strike and boycott threats of the rival union he did not have to reduce the agreement to writing. (Acme Breweries.)

**Collective Contract Preferable*

Making individual contracts may be regarded as a violation of the Wagner Act when it interferes with the lawful right of employees to self-organization. Particularly is this the conclusion which the Board or courts will reach if they can read into the negotiations an effort to forestall union activity and create a permanent barrier to union organization among the employees. (Western Cartridge Company.)

**Freedom of Contract*

Neither employer nor union may prevent collective bargaining even though by contract the employer and the union agree that the employees are directly representatives of management. The fact that the union is a party to the contract does not prevent the union from disavowing it. Statutory rights may not be thus bargained away. (Packard Motor Company, Ford Motor Company.)

While unions have almost absolute power of control over their membership, the Board enjoys unlimited authority over union-employer contracts, once the contract comes before it, in determination of a dispute.

**Cancellation of Contract*

WLB denied the union's right to avail itself of a cancellation clause which could have been invoked had notice been given within a week as prescribed, even though cancellation was

STYLE as well as SAFETY for Women Welders

HAT CREATED BY JOHN FREDERICS
... CLOTHING CUT FROM
DRESSMAKER PATTERNS

AO Tailored Sleeves and Tailored Overalls. Also available: Tailored Cape Sleeves and Bib, and Tailored Aprons.

AO Tailored Coat. Also available: Tailored Short Jackets and Gloves and Mittens.

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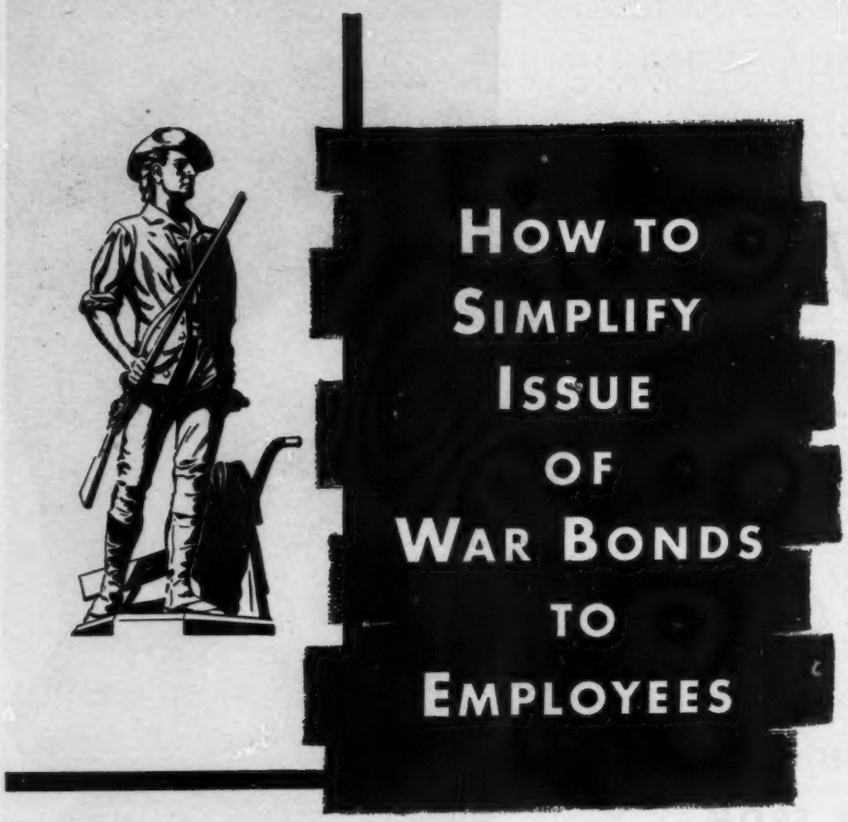

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justifiable since the employer had refused to arbitrate an issue which the contract required to be arbitrated. (Celanese Corporation.)

**Access to Records*

Management is under the duty to afford the union access to seniority records of all employees both members and non-members. (Leviton Manufacturing Company.)

**Regulation May Not Be Arbitrary*

While a company may forbid solicitation of dues during working hours, it may not bar such solicitation after hours on company premises, even though the purpose of such regulation was to avoid trouble over union rivalry. (Ohio Public Service Company.)

**Improper Timing of Rules*

Promulgating a rule when a union was in the process of organizing constituted a violation of the Wagner Act, even though the rule, barring solicitation of membership although after work and during lunch and rest periods, was allegedly issued to prevent interference with war production. (Denver Tent & Awning Company.)

**Held Discrimination*

Held discriminatory was refusal to reinstate an economic striker for refusal to cross a picket line (Magnolia Petroleum Company); and resignation of an employee under anti-union pressure was held to constitute a discriminatory discharge. (East Texas Motor Freight Lines.)

**Evidence of Domination*

Abandonment of uniform wage treatment and the granting of a raise to unorganized employees following close upon the designation of the union as the appropriate bargaining agency constitutes a violation of the Wagner Act. (Appalachian Electric Power Co.)

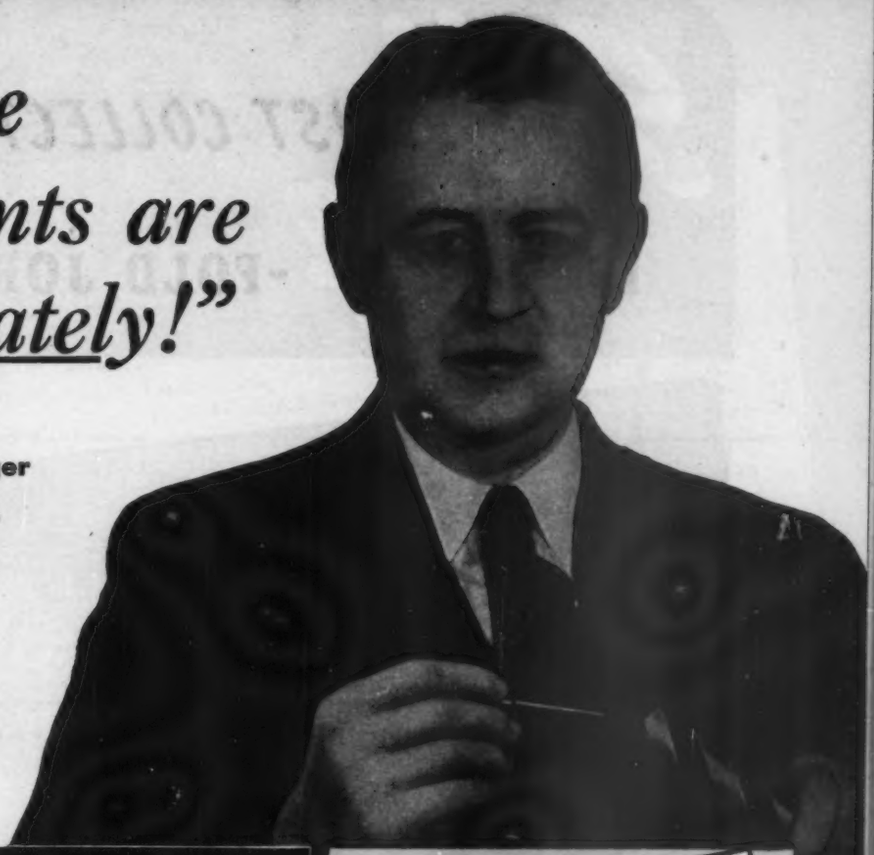
No election, no records, and no provision for dues were held evidence of company domination. (Century Oxford Manufacturing Company.)

**Enforcement*

A cease-and-desist order will be enforced even though the offending company had ceased its unfair labor practices since the Act specifically provides that the Board may proceed against a company for engaging in unfair labor practices in past as well as present. (NLRB vs. Burke Machine Tool Company.)

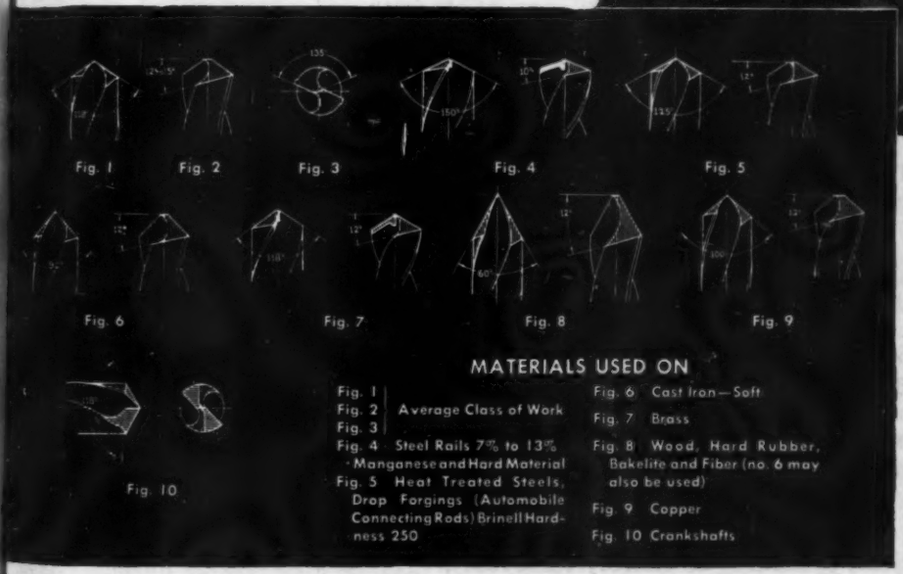
The State Labor Relations Board of New York was not divested of its authority to enforce its orders by the fact that the business was sold. (NYLRB vs. Davy Jones Seafood House, Inc.)

"Be sure twist drill points are ground accurately!"



says **A. J. SNYDER, Works Manager**
MORSE TWIST DRILL & MACHINE CO.
New Bedford, Mass.

OBTAINING MAXIMUM EFFICIENCY from twist drills is possible only when points are ground correctly. In modern drilling practice, drilling different grades of materials often requires a modification of the commercial 118° drill point. For example, hard materials require a blunter point than do soft materials. (See chart below.)



MATERIALS USED ON

Fig. 1, Fig. 2, Fig. 3 — Average Class of Work
Fig. 4 — Steel Rails 7% to 13% Manganese and Hard Material
Fig. 5 — Heat Treated Steels, Drop Forgings (Automobile Connecting Rods) Brinell Hardness 250
Fig. 6 — Cast Iron—Soft
Fig. 7 — Brass
Fig. 8 — Wood, Hard Rubber, Bakelite and Fiber (no. 6 may also be used)
Fig. 9 — Copper
Fig. 10 — Crankshafts

"FOR A DRILL to perform satisfactorily, the cutting edges should have a proper and uniform angle with the longitudinal axis of the drill. Also, the cutting edges should be of exactly equal length, with the proper lip clearance or contour of the surface back of the cutting edges. This clearance must be the same on each lip. When cutting lips are not uniform, holes will be oversize and the drill will wear on the margin of one cutting lip."

"THE FORM of a drill point exerts a powerful influence upon the rate of production, accuracy of drilled holes and the number of holes which can be drilled between successive grindings. Drill grinding machines, located in tool rooms throughout the plant, are steps toward getting the correct point on drills, as it is difficult to grind a point by hand that will give the desired results without too much loss of time."

The correct cutting oil is as important to proper drilling operations as the correct grinding of the drill points. That's why Shell has developed a control technique that "balances" the oil to the machine, the application and the tool. Call in the Shell man now for details.

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FOR METAL WORKING

SLY DUST COLLECTOR DOES A 4-FOLD JOB

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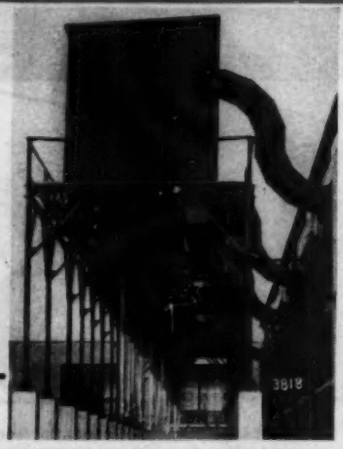

End view of Sly Dust Filter with standard supports mounted on concrete piers, for truck passage under dust hoppers.

Exhausts—

1 —Blast Cleaning Equipment
2 —Tumbling Mills
3 —Grinders
4 —Polishing Wheels and Grinders

This Sly Dust Collector consists of four dust filters, two classifiers, two combination spark arresters and classifier, and three fan houses, as shown in the sketch. It does a thorough job of exhausting all dust created by cleaning and polishing operations.

Sly Dust Filters offer certain exclusive advantages which help enormously in efficient operation:

(1) Greater filtering capacity because of more filtering cloth
(2) Taut bags (patented) save power and improve dust removal
(3) Bags more easily replaced
(4) Automatic control (and degree) minimizes or entirely removes the human factor
(5) Simpler shaker mechanism results in savings in maintenance and operation

Write us fully. We shall analyze your situation and tell you exactly what can be accomplished. Sly Dust Control pays for itself.

THE W. W. SLY MFG. CO.

4755 Train Avenue — Cleveland, Ohio

SLY INDUSTRIAL DUST CONTROL

Management Shorts

(Continued from page 118)

Work simplification material is ready to go in this compact cart

material on hand for demonstrations of work simplification principles, designed as cart for storage and transportation of the equipment.

This equipment includes a 16-mm. projector, rolls of films, layout planning board with models, demonstration charts, supply bins of several varieties with an adjustable work area arrangement, supplementary material, and a supply of flow process charts.

A special parking space in the educational section of the plant is provided for the cart, to which space it is returned following each conference.

•

In Syracuse, N. Y., industry and the University cooperate to run down to their source rumors regarding any phase of factory operation. If the originators seem to be innocent of ill intent, they are warned. But if there is any basis for the rumor, complete information is turned over to the plant involved—so proper steps can be taken before harm is done.

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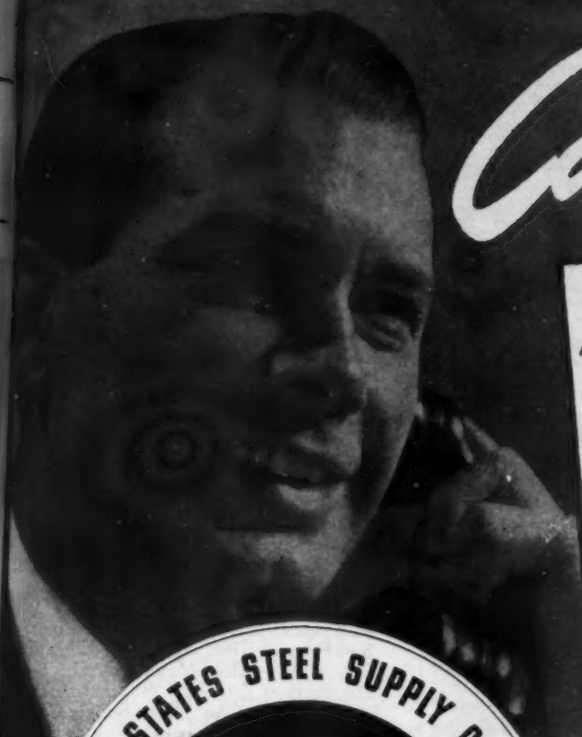
Silver dollars help combat absenteeism at William Sellers & Company, Inc., Philadelphia. Workers who are 100 percent on the job during the month receive in their next regular pay envelope a silver dollar. This silver dollar is attached to a red, white, and blue card which announces that the recipient is a member of the "Sellers 100% Club."

"The medal you can spend" is fitted into



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We welcome your inquiries and will gladly assist you in determining the grades best suited to your needs. Telephone, write or wire the warehouse nearest you.

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Our Chicago Warehouse has been designated by the War Production Board as a warehouse to distribute the following aircraft products:

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UNITED STATES STEEL

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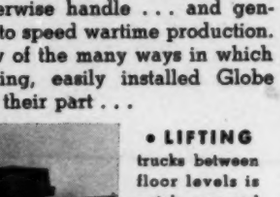
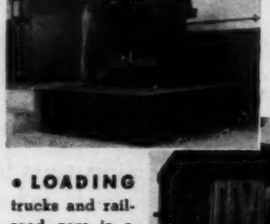
Help Solve Manpower Problems by Opening More Jobs to Women and Older Men

Day after day . . . 24 hours per day . . . Globe Oil-Hydraulic Platform Lifts stand ready to do the heavy lifting jobs in your plant . . . conserving human energy for more productive work . . . enabling women and older workers to perform easily jobs they could not otherwise handle . . . and generally helping to speed wartime production. Here are a few of the many ways in which smooth operating, easily installed Globe Lifts are doing their part . . .

• LIFTING trucks between floor levels is quick, easy and safe on a Globe Platform Lift.



• LOADING trucks and railroad cars is a one-man job.



• FEEDING machines from a Globe Platform Lift at proper level is faster, less tiring.

• AIRPLANE production and servicing are speeded by use of Globe Powered-Hydraulic Airplane Hoists.

For More Applications and Types of Lifts

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LIFTS and ELEVATORS

This card and silver dollar go to non-absent workers eligible to 100% Club

a V-shaped slot on the card. A little note on the back of the membership certificate says, "This Sellers 'Silver Dollar' is your recognition of being 100% on the job during the past month. Spend it with pride. Tell people why you got it. Five of these cards will get you a substantial cash award. Save them . . ."

The company does not consider the silver dollar in itself as a bonus, but the employee who receives five of them will later find a substantial cash award in his pay envelope.

•

Color Bars Simplify Materials Handling

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In making our press room layouts we take into consideration the volume (on a weight basis) of each kind of material that every machine works in a year, so that machines handling a considerable quantity of a particular material can be grouped close together. In this way we avoid long moves of great quantities of material.

To help us visualize the relative amounts of each material that each machine uses, we plot what we call a "standard area" on each machine templet—the area is the same on each templet regardless of templet size—and divide it into vertical areas proportioned according to material quantities. For example, if 40 percent of the material to be used by a certain machine in a year is to be X material, we assign 40 per cent of the "standard area" on the templet for that machine to X material. Then we color these vertical areas, each in a different color, so that large blocks of the same color will stand out, and indicate that the

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Columbus — Columbus Iron Works Co.
Rome — Battey Machinery Company

ILLINOIS
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Decatur — The Field & Shorb Co.
Quincy — E. Best Plbg. & Htg. Supply Co.
Rockford — Mid-States Industrial Corp.

INDIANA
Indianapolis — Van Camp Hardware & Iron Co.

IOWA
Des Moines — Globe Machinery & Supply Company

KANSAS
Leavenworth — Great Western Mfg. Co.

KENTUCKY
Hopkinsville — Cayce Mill Supply Co.
Louisville and Lexington — Tafel Electric & Supply Co.
Paducah — Henry A. Petter Supply Co.

LOUISIANA
Monroe — Weaks Supply Company, Ltd.
New Orleans — Standard Supply & Hdwe. Company, Inc.

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Omaha — American Machinery & Supply Company
NEW HAMPSHIRE
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Newark—Dodge-Newark Supply Co., Inc.
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Double Life Is Why Research Leather Belting Is Preferred Over Rubber V-Belts for Pivoted Base Drives

Belt life is longer with Research Leather Belting due to:

1. high frictional surface—less tension required to grip pulleys
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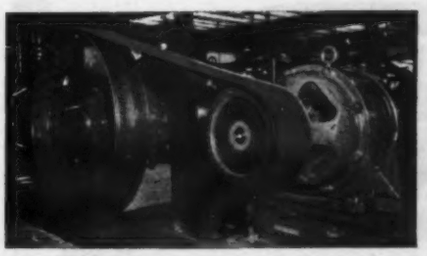
"Fifty Reports on Mechanical Power Transmission from Motor Drive to Industry" (Robert Drake) proves that a first-quality leather belt will last at least twice as long as a rubber V-belt on a corresponding pivoted base drive.

And since Research is the leather industry's top belt (specified more than any other brand), it is your soundest buy for both performance and economy.



Research Leather Belting on Pivoted Motor Drive ("Production Drive")

GRATON & KNIGHT CO., Worcester, Mass.

Only leather belting manufacturer with complete nation-wide service facilities. Branches in Chicago, Cleveland, Dallas, Detroit, Kansas City, Minneapolis, New York, Philadelphia, San Francisco. See adjoining column for distributors (also listed in THOMAS' REGISTER.)

This Is What Happens When Sweating Robs the Body of Salt . . .

Keep This Arm On The Job!

Heat-Fag attacks workers who don't replace the body salt lost through sweating. Heat-Fag undermines vitality — destroys the will to work —makes men careless. And, in many cases, it is the direct cause of lost man-hours, absenteeism and accidents.

Heat-Fag is the all-out, unseen enemy of production. Thousands, yes, millions of precious man-hours can be lost through this insidious force that saps men's strength — lowers their efficiency — wears them down before the shift is over. Salt sweated from the body must be replaced — or Heat-Fag takes its toll.

In all leading industrial plants — wherever men sweat and do hot work — salt tablets are a "must".

MORTON'S Heat-Fag SALT TABLETS

QUICK DISSOLVING
(Less than 30 seconds)
This is how a Morton Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds

Case of 9000, 10-grain Salt Tablets, $2.60
Salt-Dextrose Tablets case of 9000, $3.15

Place
MORTON'S DISPENSERS
at all Drinking Fountains.
They deliver salt tablets, one at a time, quickly, cleanly — no waste. Sanitary, easily filled, durable.

500 Tablet size - $3.25
1000 Tablet size - $4.00

Order from your distributor or directly from this advertisement . . . Write for free folder.

MORTON SALT COMPANY • CHICAGO, ILLINOIS

machines on which that color appear should be grouped.

Material flow lines we indicate in the same colors assigned to represent the materials on the templet. One other step is to indicate sequence of operations by placing sequence numbers in each of the colored vertical sections. This means that if yellow is the color assigned to X material, the area showing quantity of that material used at the first machine working on that material will have the number "1," and the templet for the second machine to which that material goes will have a number "2" inscribed in the corresponding vertical section on the standard area.

Percentages are figured from the machine handling the greatest quantity of material in a year. Volume worked on that machine is considered as 100 percent. All quantities on all other machines are then calculated as a percentage of that figure, and the standard areas on the templets are divided according to those percentages.

Where bulk is a factor as well as weight, we plan our layouts on a material-handling-hours basis, and apportion the standard areas according to hours of handling required, rather than weight alone.

•

After fluorescent lighting has been installed, it is well to remember that ballasts and starters last longer if defective lamps are replaced immediately, and that regular dusting and washing of the lamps helps maintain a high lighting level.

•

Right Use of Color Cuts Down Accidents

SOURCE—Curtiss-Wright Corporation, Airplane Division, Columbus, Ohio

Painting power presses and shears at the point of operation in light tones that contrast with the dull regular machine finish has been of benefit in affording protection to employees at the Columbus plant.

Brightness at the point of work highlights the danger area and serves as a warning to the operator when his hands approach it. Contrast between the color of the danger area and the moving parts of the machine serves as an additional safety factor.

Besides minimizing the physical accident hazard, the combination of color and light, or "three-dimensional seeing" as it is termed, has a favorable effect on morale through brightening up the workplace. Touches of color greatly relieve drab, dull gray or black surfaces, and operators are much more inclined to take pride in keeping bright surfaces clear.

It is reported that eyestrain, nervous-

For Continuing Achievement

A STAR FOR WESTON

—evidence that the vital instrument situation rests in good hands!

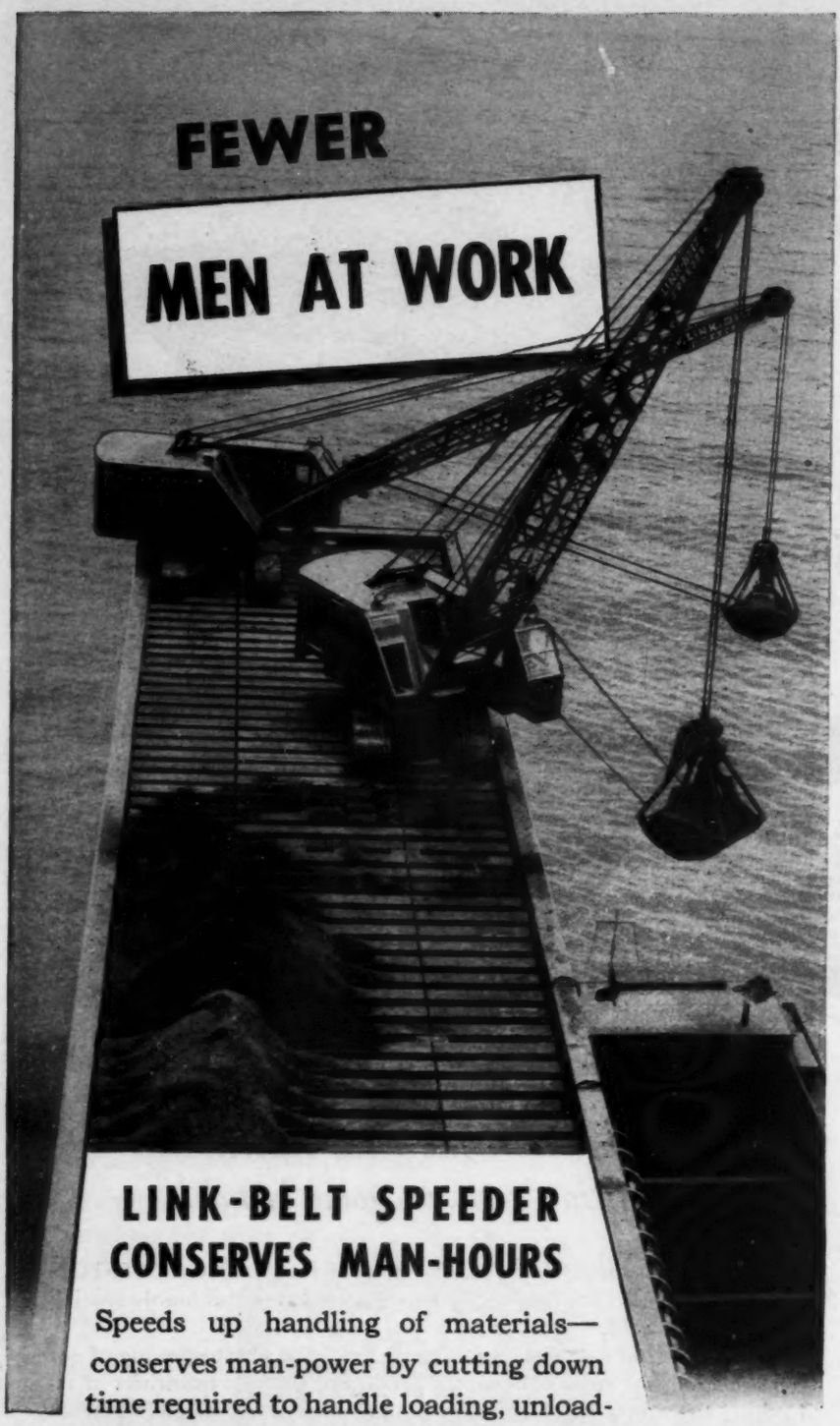
A star now adorns the ARMY-NAVY "E" pennant awarded to WESTON just 6 months ago . . . the first such pennant awarded in this highly specialized instrument field.

It's a star that has *real meaning*. Because, from the very beginning of our defense period, the responsibility for producing the vast quantities of instruments vital to the success of our country's efforts, has rested largely on the instrument leader.

This star signifies that the responsibility *rests in good hands*. "The men and women of the WESTON Electrical Instrument Corporation," writes the Chairman of the Navy Board for Production Awards, "have achieved a signal honor by continuing their splendid production in such volume as to justify this award . . . indicating their solid determination and ability to support our fighting forces with equipment necessary for victory."

But a great instrument task still remains . . . before victory is ours. So WESTON workers continue reaching for new goals . . . with the same determination, the same painstaking devotion to the quality ideal, responsible for WESTON'S *continuing leadership* in the instrument field.

WESTON ELECTRICAL INSTRUMENT CORPORATION, NEWARK, NEW JERSEY



LINK-BELT SPEEDER CONSERVES MAN-HOURS

Speeds up handling of materials—conserves man-power by cutting down time required to handle loading, unloading or stacking operations. Engineered for speedy finger-tip control—designed for rugged, day-after-day performance—Link-Belt Speeders are "men-of-war" fighting on the production front!

9110

LINK-BELT SPEEDER

BUILDERS OF THE MOST COMPLETE LINE OF
SHOVELS—CRANES—DRAGLINES

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(A DIVISION OF LINK-BELT COMPANY)

ness, and fatigue are greatly reduced b the intelligent use of paint and ligh Production is facilitated by reducin mistakes and errors in judgment tha result in accident.

•

Blind Worker Repairs, Cleans Safety Goggles

Physically handicapped workers are doin much to relieve the manpower shortag and help the war effort. George Popl totally blind, repairs and cleans safet

Heat from a light bulb and trained fingers help blind worker sort lenses

glasses and goggles at the Caterpillar Trac tor Company, Peoria, Ill.

His trained, sensitive fingers sort lenses of clear glass from those of green glas quickly and accurately. By holding each lens over a light bulb for about three sec onds, he can "feel" the difference. Heat rays pass through the clear glass more quickly than through the green glass.

•

Shearing Leftovers Used to Save Metal

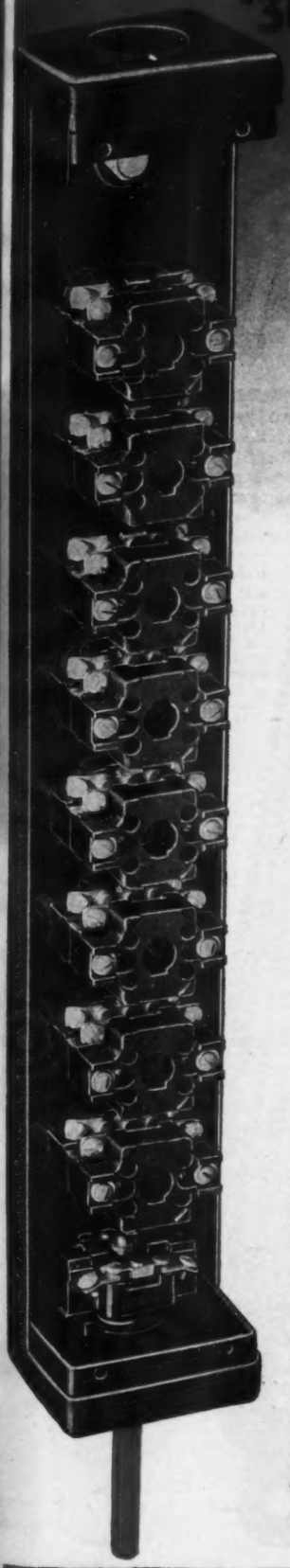
SOURCE—Westinghouse Electric & Manufacturing Company, E. Springfield, Mass

An average weekly saving of 3300 pounds of sheet aluminum and 5300 pounds of sheet steel has been accomplished by the simple plan of assorting, according to thickness, leftover ends from shearing operations and using them for the fabrication of small parts.

Ordinarily the short end pieces would be sent to the salvage department to be returned to the metal processors. Now production schedules are carefully planned so that larger pieces are cut first and smaller pieces cut in order of size.

It is estimated that 165,000 pounds of new sheet aluminum and 265,000 pounds of steel will be saved in a year.

"3C" TYPE "D" HEAVY DUTY PUSH BUTTONS STATION FOR LARGE MACHINING OPERATIONS



"3C" Type "D" Heavy Duty Push Buttons are adaptable to countless combinations on frequently operated machine tools. To the left is a typical single line unit station. This type is available for 5- 7- 9- or 11-units, but 3 or 4 units can be put in the 5-unit, 6 in the 7-unit, 8 in the 9-unit, and 10 in the 11-unit. In other words, the same 5- 7- 9- or 11-unit cases can house 3 to 11 units, including the "Emergency-Stop" handle or stem at the bottom of the case, which permits breaking the circuit by moving this handle in any direction.

The Pendant Station to the right has been called the "Horse Collar" or "Doughnut" because of its resemblance; but it is a particularly efficient station for multiple operations. Its specially designed shape permits operation from any angle; it fits into spaces where a single line unit station would be awkward to use, and gives the operator instant control of all operations. This is available with up to 14 Push Button units, and a smaller number of units if Selector Switches for jogging or inching are used. This form permits the use of either hand for actuating, the "Emergency-Stop" device at the bottom providing the same features as mentioned above.

OPERATED WITH EITHER HAND— FROM ANY ANGLE

In all "3C" Pendant Stations there is plenty of wiring space; all wiring parts are duplicates of other Type "D" Buttons, and wiring is simplified.

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THE CLARK CONTROLLER CO.

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Thorough Oakite cleaning may make the difference!

Due to the prevailing shortage in air conditioning equipment and the EXTRA load that existing units are currently carrying, every material, idea or method that contributes to HIGHER EFFICIENCY and LONGER LIFE of equipment should be carefully considered. Regular maintenance, particularly THOROUGH CLEANING at periodic intervals, is one of the FIRST and most important steps in meeting these wartime demands.

Specialized Oakite materials have been developed that will HELP YOU do the job right. Also enable you to save time, conserve manpower and secure superior results on such essential jobs as:

Cleaning air filters

Conditioning water supplies of recirculating systems

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Safely de-scaling condensers & water-cooled compressors

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For details, consult our nearby Technical Service Representative, or write for FREE booklets and data sheets.

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Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized cleaning*
Buy Bonds for Victory
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

BOOKS

MATERIALS HANDLING

Harry E. Stocker, director, Harry E. Stocker Associates; assistant professor of transportation, New York University. Prentice-Hall, Inc., 70 Fifth Ave., New York. 309 pages. Photographs, drawings, tables, index. $5.

Fundamental principles, equipment, and methods involved in handling commodities other than those handled in bulk are explained. In two parts: "Principles of Materials Handling," and "Equipment and Methods." Four appendixes: "Engineering Data," "Practical Truck Engineering," "Specifications for Pallets and Equipment," "Effect of Floor Conditions on Power Consumption and Tires of Industrial Trucks."

WORLD MINERALS AND WORLD PEACE

C. K. Keith, J. W. Furness, Cleona Lewis. The Brookings Institution, Washington, D. C. 253 pages. Diagrams, tables, charts, index. $2.50.

Both in volume and variety the mineral requirements of industry have been increased. This book is intended to present a factual study of trends in the mineral field—physical, economic, and political—and to analyze the possibilities of controlling minerals to prevent preparation for war. In three parts: "Physical and Commercial Trends," "Recent Trends in Political and Economic Control," and "The Future."

ECONOMIC UNION AND DURABLE PEACE

Otto T. Mallery, Harper & Bros., 49 E. 33rd St., New York. 183 pages. Index. $2.

Realistic and constructive approach to the handling of economic issues, now and after the war. The "economic union" is a transitional method for a period of change. It is a functional approach to minimize and adjust some of the causes of international economic conflicts that otherwise must continue to result in war. In three parts. Part I gives a telescopic view of the whole proposal. Part II places a magnifying glass upon each function or objective. Part III shows in tabloid form some of the best-known plans for the organization of the post-war world and analyzes their differences.

INDUSTRIAL RELATIONS HANDBOOK

Edited by John Cameron Aspley and Eugene Whitmore. The Dartnell Corp., 4660 Ravenswood Ave., Chicago. 1056 pages. Photographs, forms, drawings, index. $10.

A compendium of the views, tested methods, experience, and practices of companies that have been successful in building sound relationships with their employees. Covers every phase of industrial relations—policies, labor contracts, employment-labor committees, hiring women, health, nutrition, records, labor supply problem, employment methods, safety, and many others.

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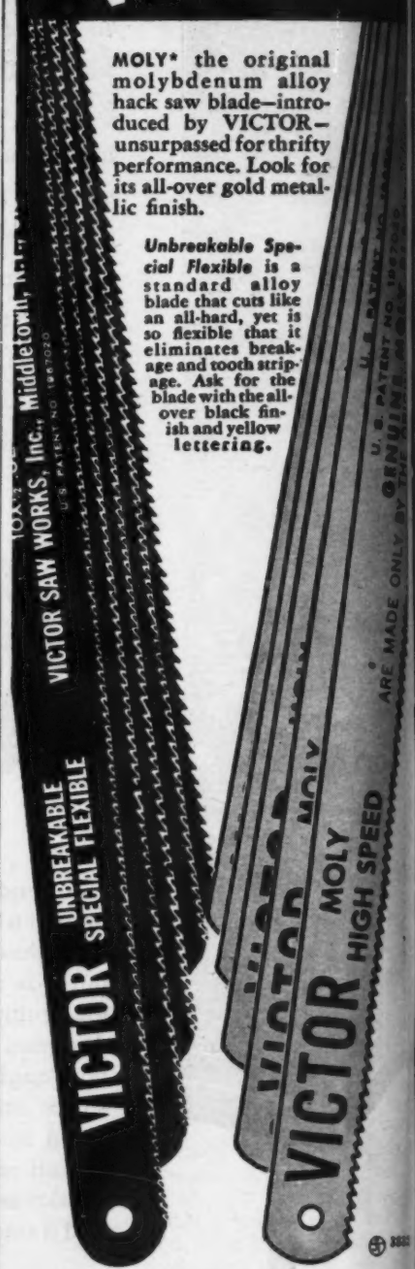
MOLY* the original molybdenum alloy hack saw blade—introduced by VICTOR—unsurpassed for thrifty performance. Look for its all-over gold metallic finish.

***Unbreakable Special Flexible* is a standard alloy blade that cuts like an all-hard, yet is so flexible that it eliminates breakage and tooth stripage. Ask for the blade with the all-over black finish and yellow lettering.**



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MIDDLETOWN • NEW YORK

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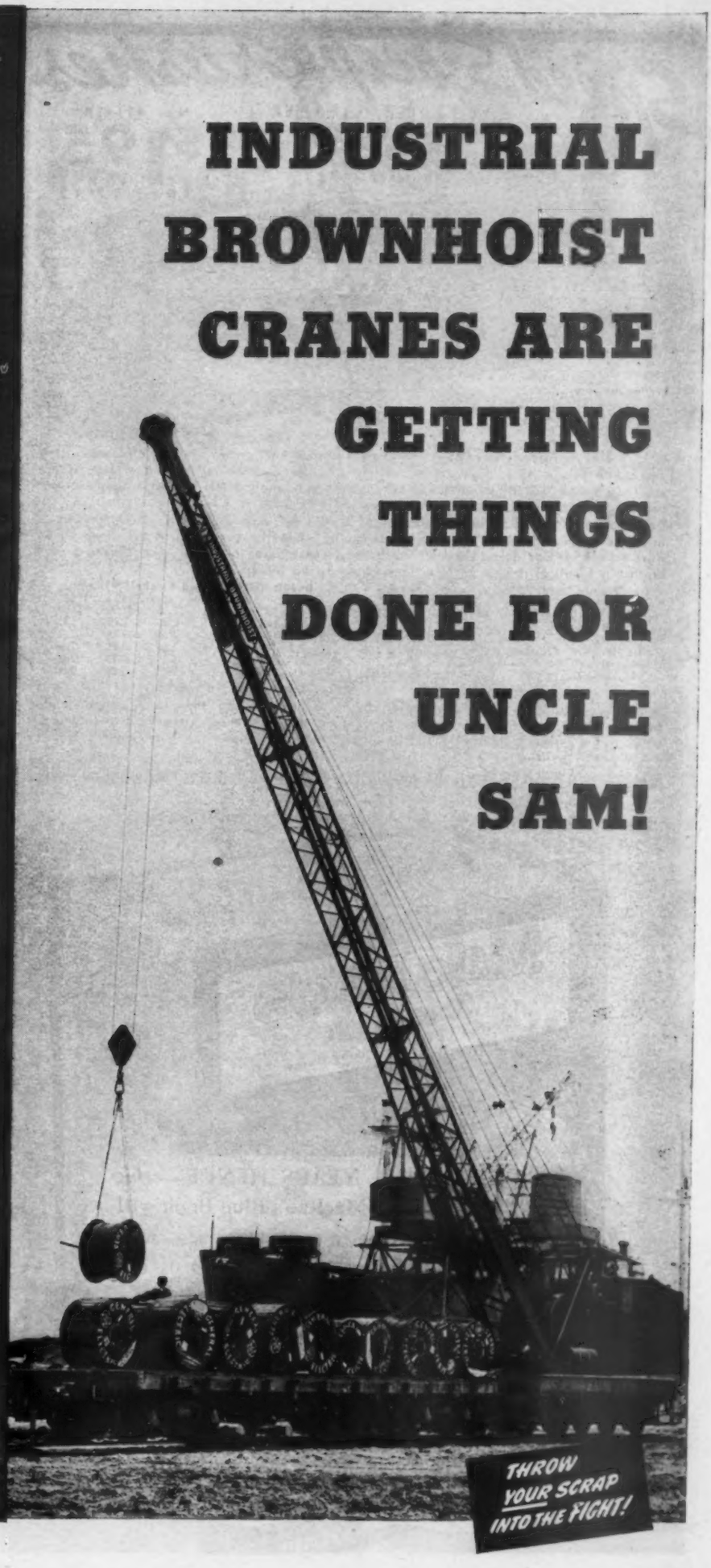
In steel mills, coal yards, shipyards, railroads and other war plants all over America, I. B. Cranes are working night and day moving heavy materials, getting things done in a hurry. I. B. Cranes are doing their jobs continuously—seldom if ever requiring time out for repairs. They're powerful—handling the tough jobs with ease. They're efficient—they get more work out of a gallon of precious fuel oil than rightfully could be expected. If you are interested in speeding up your share in America's war effort, I. B. Cranes can help you. Write to Industrial Brownhoist Corporation, Bay City, Michigan. District offices: New York, Philadelphia, Pittsburg, Cleveland, Chicago.



INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

Speed Sweep Brushes

FOR FASTER, CLEANER EASIER SWEEPING

No. 411-14"

$1.95 EACH LOTS OF 12

Wire-drawn tufts.
Adjustable handle.
Highest grade bassine fibre.
Narrow light weight block with Pressed Steel back.

Heavy Duty "Speed Sweep"—the ideal brush for heavy work through grease, cutting oils, metal filings, etc. High grade bassine tufts are compact and trimmed for "spring and snap action." Study its unique construction, and you'll understand why it does a better sweeping job in less time and with less work.

Double Duty "Speed Sweep" handles fine dust as well as heavy dirt. Two center rows of tufts are of heavy bassine to handle rough dirt while the outside rows are finer Union fibre to control fine dust particles. The general construction of Double Duty Speed Sweep brushes is identical to that of the Heavy Duty Speed Sweep.

Heavy Duty "Speed Sweep" Prices				Double Duty "Speed Sweep" Prices			
Size	6	12	24	Size	6	12	24
No. 410—12"	$2.25	$1.80	$1.60	No. 420—12"	$2.35	$1.95	$1.75
No. 411—14"	2.35	1.95	1.75	No. 421—14"	2.55	2.15	1.95
No. 412—16"	2.50	2.10	1.90	No. 422—16"	2.75	2.35	2.15
No. 413—18"	2.60	2.20	2.00	No. 423—18"	3.00	2.55	2.35
No. 414—20"	2.75	2.35	2.15	No. 424—20"	3.15	2.75	2.50
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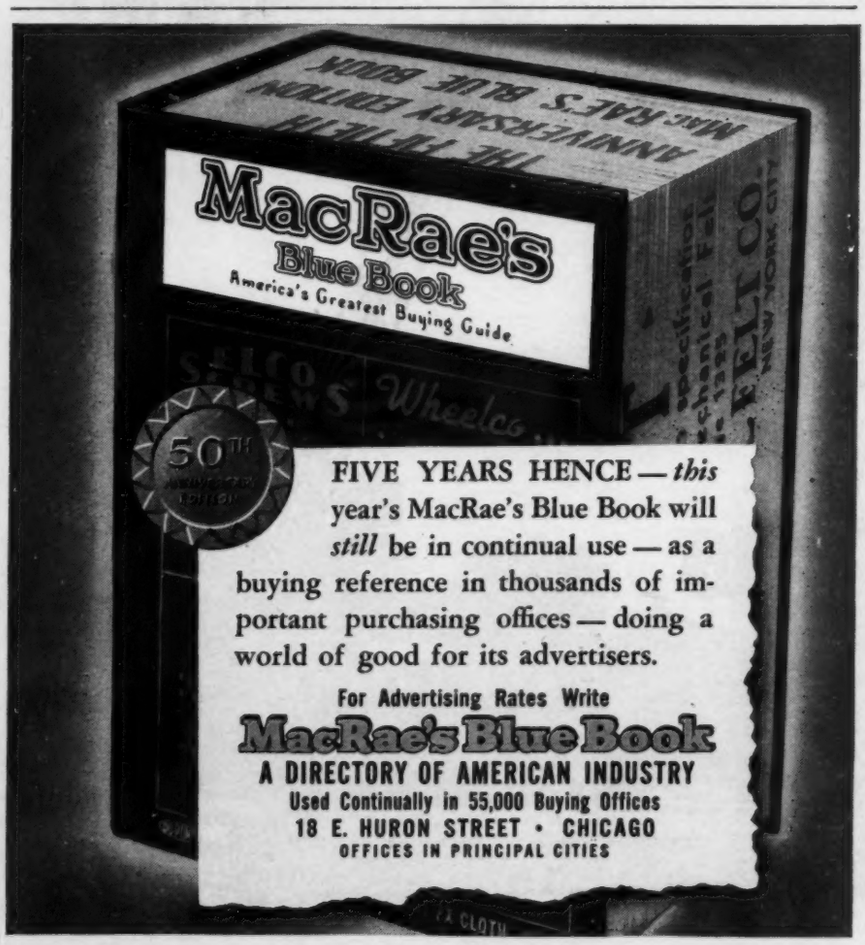
All brushes have 5¼" trim. Prices are f. o. b. Milwaukee

Speed Sweep brushes have been proved by so many firms and under such varied conditions that they are sold with an unconditional guarantee to meet your requirements. Full credit if you return brushes within 10 days. Order today. Shipment will be made promptly if you supply at least an A-10 rating and End Use symbols.

MILWAUKEE DUSTLESS BRUSH CO., 526 N. 22nd St., Milwaukee, Wis.



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ment of Physics and Astronomy, Michigan State Normal School; Francis W. Sears, associate professor of physics, Massachusetts Institute of Technology; assisted by Major Francis C. Crotty, U. S. Army, director of training, Watertown Arsenal, Watertown, Mass. Houghton Mifflin Co., 2 Park St., Boston. 300 pages. Photographs, drawings, index. $1.75.

Prepared at the request of the War Department and the U. S. Office of Education in conformance with official pre-induction training course outline No. PIT-102. Deals chiefly with the basic principles of machines. Clear writing, plus easy step-by-step guidance from familiar experiences to an understanding of principles of machines, makes the subject almost self-teaching. Divided into 14 units—each a separate subject. Self-tests and exercises are included.

HEATING, VENTILATING, AIR CONDITIONING GUIDE, 1943

Published by American Society of Heating and Ventilating Engineers, 51 Madison Ave., New York. 1160 pages, plus roll of membership. $5 (thumb-indexed, $5.50).

Twenty-first edition. Contains technical data section of reference material on the design and specifications, of heating, ventilating, and air conditioning systems, a manufacturers' catalog data section, roll of membership, together with complete indexes to technical and catalog data sections.

MANPOWER FOR VICTORY

John J. Corson, formerly director of the U. S. Employment Service, director of the Bureau of Old Age and Survivors Insurance. Farrar & Rinehart, 232 Madison Ave., New York. 299 pages. Drawings, charts, tables. $3.

According to the foreword by Paul McNutt, "this book represents the kind of orderly and systematic thinking that will help America toward the solution of its manpower problems." Treats the problem from two angles—the national and the personal. Chapter headings include "The Manpower Problem," "Where Is Manpower Required?" "Where Has the Manpower Come From?" "The Community at War," "As Manpower Is Exhausted," "Where Will Additional Manpower Be Found?" "Expanding Manpower by Training," "Machinery for Manpower Mobilization," "How Shall We Get Manpower Where It Is Needed?" "When 'D-Day' Comes."

ASTM STANDARDS ON ELECTRICAL INSULATING MATERIALS

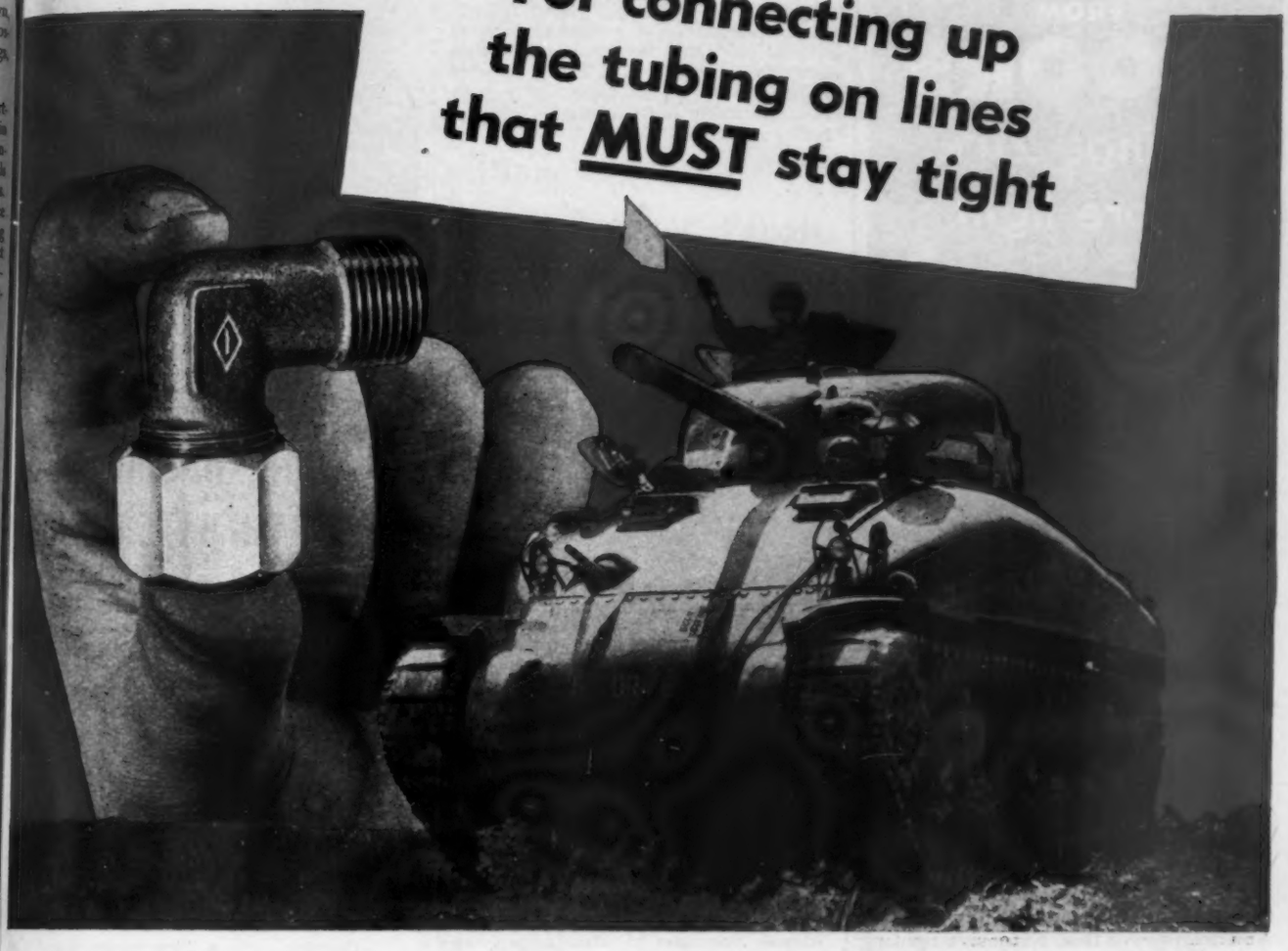
Prepared by ASTM Committee D-9. American Society for Testing Materials, 260 S. Broad St., Philadelphia. 441 pages. Photographs, drawings, tables, index. $2.50.

Specifications and tests on insulating varnishes, paints, lacquers, and their products, and molded insulating materials. Section on plates, tubes, and rods has two specifications and ten standard test methods. Three standards covering mineral oils for electrical insulation, and four standards covering ceramic products, including glass insulators, porcelain, and steatite, are included.

TECHNIQUE OF PRODUCTION PROCESSES

John R. Connelly, Captain, U. S. Army Ordnance Dept., Springfield Armory, associate professor of industrial engineering, Lehigh

For connecting up the tubing on lines that MUST stay tight



THE rapid increase in requirements for war equipment and production machinery has created many new applications of tubing for fuel, oil, lubrication, air, vacuum and other lines. To meet this demand it is necessary for both designers and production men to know more about tubing connection practice.

Although it would seem to be quite a simple engineering problem, it has taken both research and engineering nearly 50 years to bring tubing connection practice up to its present day standard. The Imperial Organization has contributed much to the advancement of tubing connection work through the development of new and better types of fittings and in the improvement of tubing application work.

In many cases Imperial engineers spend much time with manufacturers of products helping to work out tubing layouts that will make it possible to use the right type and fewest number of fittings. Thus the danger of tubing failures due to faulty connections is eliminated and often the costs are reduced.

If you have problems that involve the use of tubing connections on essential war equipment or on production machines that are turning out war products, we should be pleased to render every possible assistance.

THE IMPERIAL BRASS MFG. CO., 517 S. Racine Avenue, Chicago, Illinois

IMPERIAL

COMPRESSION, S.A.E. FLARED, INVERTED FLARE, HI-DUTY AND FLEX FITTINGS AND COUPLINGS FOR STEEL, COPPER, BRASS, ALUMINUM AND NEOPRENE TUBING • SHUT-OFF COCKS • TUBE CUTTERS, BENDERS, REAMERS, AND FLARING TOOLS

LIGHT FROM FLOORS brings 20% more light

A light-colored concrete floor made with Atlas *White* portland cement reflects more light than a floor made with *gray* portland cement and very much more than a floor made with still darker materials. Installations in aircraft plants for Boeing, Consolidated, Douglas and North American prove this. Extensive lighting tests show that a white-cement floor, compared with a gray-cement floor in the same plant—

- ***Provides 20% more light on vertical work surfaces (see illustration);***
- ***Reflects 61% more light to underside work surfaces.***

These increases in illumination sharpen vision, reduce accidents, decrease spoilage, increase production.

Concrete floors made with Atlas *White* portland cement have the same characteristics, including durability, as concrete floors made with gray portland cement. In addition, they are light in color.

Maintenance is simple—frequent sweeping, occasional damp mopping, periodic scrubbing.

Send for new book, "Light from Floors." Write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

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WHITE CEMENT
For Light-Reflecting Floors

University. McGraw-Hill Book Co., 330 W. 42nd St., New York, 430 pages. Photographs, drawings, charts, tables, graphs, index. $4.

Intended to give the student a background knowledge of the principles of industrial operations such as casting, forming, material removal, and joining, as well as an understanding of industrial plants and their problems. Covers study in this field up to the level of advanced specialized work. Four appendixes are devoted respectively to "Problems," "Projects," "Bibliography," and "Glossary."

•

BOOKLETS

THE USE OF PART-TIME EMPLOYEES IN WAR INDUSTRIES. A preliminary report of a survey of American industry and a selected bibliography of reports of British experience. Industrial Relations Section, Department of Economics and Social Institutions, Princeton University, Princeton, N. J. 21 mimeographed pages. No charge.

MORE MANPOWER THROUGH REDUCTION OF ABSENCES. A panel discussion by R. R. Sayers, M.D., director, U. S. Bureau of Mines; W. M. Gafafer, Sc.D., senior statistician, U. S. Public Health Service; J. J. Wittmer, M.D., director, personnel department, Consolidated Edison Co., Ned H. Dearborn, Ph.D., executive director, National Safety Council; Simon S. Leopold, M.D., School of Medicine, University of Pennsylvania; William S. Kushnick, director, Civilian Personnel and Training, U. S. War Department. Industrial Hygiene Foundation, 4400 Fifth Ave., Pittsburgh, Pa. 63 pages. Graphs. 50c.

JOBS, FREEDOM, OPPORTUNITY IN THE POST WAR YEARS. Preliminary observations by the Postwar Committee of the National Association of Manufacturers, with particular reference to (1) nature of the postwar problem; (2) domestic requirements for prosperity; and (3) external requirements for prosperity. National Association of Manufacturers, 14 W. 49th St., New York. 47 pages. Single copies up to 10, no charge. $12 per hundred copies.

•

ON THE CALENDAR

MAY

5–6, American Management Association, Production Conference, Hotel Statler, Cleveland. James O. Rice, Assistant Secretary, 330 West 42nd St., New York.

6–7, American Leather Belting Association, National Meeting, Hotel Commodore, New York. E. R. Rath, Executive Vice-President, 53 Park Row, New York.

10–11, American Institute of Chemical Engineers, Semiannual Meeting, Waldorf-

ОНИ ХОРОШИ
ОНИ ЗАМЕЧАТЕЛЬНЫ

Don't speak Russian? Then let us translate the words of a Russian General to an American War Correspondent:

"THEY'RE GOOD
THEY'RE EXCELLENT!"

You see, the Correspondent had just remarked upon the number of "Connecticut" field telephones in use by the famed Cossack Cavalry. ' ' ' Like many an American industry, our reputation for know-how rests today on the performance of our products in the service of the United Nations, all around the world. ' ' ' When we can again freely solicit your patronage, there will be no testimonial to which we shall point with greater pride than the commendation of the fighting Russians.

ARMY E NAVY

CONNECTICUT TELEPHONE & ELECTRIC DIVISION

GREAT AMERICAN INDUSTRIES INC.

MERIDEN, CONNECTICUT

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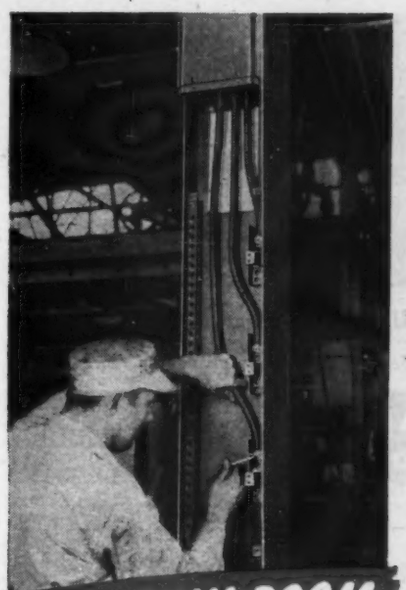
HOW TO DO 4 HOURS WORK IN 3

BullDog
Narrow Column Circuit Breaker Panels
—a Quick Windup to Wiring Jobs

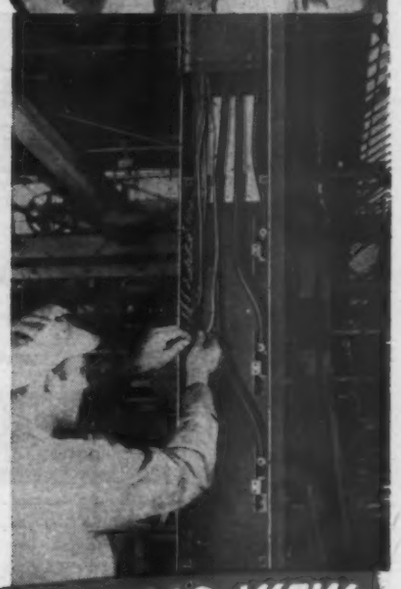
1-ONE MAN JOB

Light, compact pieces—no heavy or complicated parts that take more than one man's time to install.



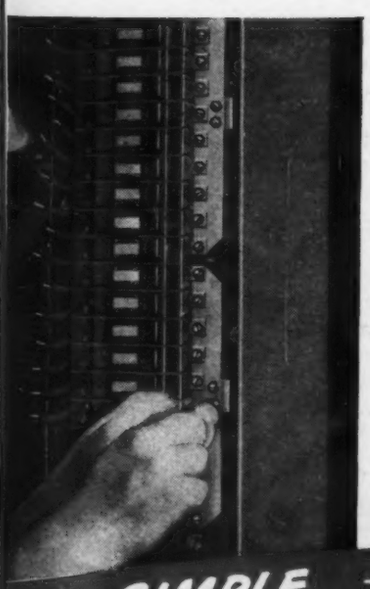
2-ELBOW ROOM

Wireman not slowed by having to work in narrow "side" gutters as cables are pulled and connected.



3-CLEAR VIEW

Work is faster, surer, as branch circuit wires are led to retainers — no groping or guesswork.



4-SIMPLE

Major wiring job done in an empty cabinet—panel is set and connections made to main cables.

5-NO SOLDER

Branch wires are readily inserted and tightened in the Solderless Wire Grips.

Now is the time when plants *must* cut every corner, to save precious maintenance time. BullDog's Narrow Column Panels meet industry's wartime need for speed of installation and ease of upkeep. Write for complete bulletin No. 426, covering various types of BullDog time and money-saving equipment.

BULLDOG
ELECTRIC PRODUCTS CO.
DETROIT, MICHIGAN
BullDog Electric Products of Canada, Ltd.
Toronto, Ontario
Field Engineering Offices in All Principal Cities

MANUFACTURERS OF Vacu-Break Safety Switches, SafToFuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems — FOR LIGHT AND POWER.

☒ METAL SPINNING
☒ DEEP DRAWN STAMPINGS
☒ METAL STAMPING
☒ POWER BRAKE WORK
☒ WELDING
☒ METAL FINISHING

AMPLE FACILITIES
For LARGE
or Small Scale
WAR TIME PRODUCTION

Spinnings up to 85" diameter! Up to 16" stroke!
Stampings up to 350 ton pressure! *Send blueprints or phone for representative*

COMMERCIAL METAL PRODUCTS CO.
2257 W. St. Paul Ave. CHICAGO, ILL. Phone ARMitage 1123

"THE NAME THAT CARRIES WEIGHT"
MERCER
MATERIAL HANDLING EQUIPMENT

MERCER WHEEL-TRACTOR CRANES make light work of heavy loads... Available in 3 ton, 5 ton and 7 ton capacities. Gasoline-powered. One man operation. Special catalog describes complete line. Write for copy today. ★ Check Mercer first, too, on your TRAILER TRUCK requirements. All types. Capacities from 2 to 35 ton. Literature available.

MERCER ENGINEERING WORKS, INC.
30 CHURCH STREET, NEW YORK, N. Y.
Works: Clifton (Allwood), N. J.

Astoria, New York. Stephen L. Tyler, Secretary, 50 East 41st St., New York.

10–13, National Fire Protection Association, Annual Convention, Palmer House, Chicago. Percy Bugbee, General Manager, 60 Batterymarch St., Boston.

24–26, National Association of Purchasing Agents, Annual Meeting, Waldorf-Astoria, New York. G. A. Renard, Secretary, 11 Park Place, New York.

26–27, National Metal Trades Association, Production Conference, Palmer House, Chicago. Charles L. Blatchford, Assistant to the Commissioner, 122 S. Michigan Ave., Chicago.

JUNE

1–3, American Society of Refrigerating Engineers, Spring Meeting, Hotel Statler, Cleveland. Major David L. Fiske, Secretary, 50 West 40th St., New York.

7–8, American Society of Heating & Ventilating Engineers, Semiannual Meeting, Hotel William Penn, Pittsburgh. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

14–16, American Society of Mechanical Engineers, Semiannual Meeting, Biltmore Hotel, Los Angeles. C. E. Davies, Secretary, 29 West 39th St., New York.

18–20, Society for the Promotion of Engineering Education, Meeting, Drake Hotel, Chicago. Sponsored by Illinois Institute of Technology and Northwestern University. Paul O. Ridings, Director of News Bureau, Illinois Institute of Technology, Chicago.

21–23, National Association of Cost Accountants, Annual Meeting, Statler Hotel, Boston. Dr. S. C. McLeod, Secretary, 385 Madison Ave., New York.

21–25, American Institute of Electrical Engineers, National Technical Meeting, Cleveland. H. H. Henline, Secretary, 33 West 39th St., New York.

25, Association of Consulting Management Engineers, Inc., Meeting, Cleveland. Nathaniel W. Barnes, Executive Secretary, 347 Madison Ave., New York.

28–July 2, American Society for Testing Materials, 46th Annual Meeting, Hotel William Penn, Pittsburgh. R. E. Hess, Assistant Secretary, 260 S. Broad St., Philadelphia.

JULY

28–31, Silver Bay Conference on Industrial Relations, 26th Annual Conference, Silver Bay-on-Lake George, N. Y. Earl M. Dinger, Secretary, 347 Madison Ave., New York.

UNIVERSITY SUMMER COURSES FOR EXECUTIVES AND ENGINEERS

June 7–25, Summer Management Course devoted to Production Planning, Plant Layout, Motion and Time Study, Wage Incentives, and Related Subjects. University of Iowa. Ralph M. Barnes, Professor of Industrial Engineering, College of Engineering, University of Iowa, Iowa City.

TISS-WRIGHT proves Morrison Stitching is seven times faster than riveting

Metal Stitcher Saves Time at Curtiss

Miss Hazel Kelsey is shown stitching felt to a metal slip ring to form a gasket for the Curtiss-Wright C-46 Commando heater cold-air duct at one of the Buffalo plants.

Metal Stitch in Time Saves 428 Hours a Week at Curtiss

New Method Is Faster Than Riveting or Spotwelding And Will Join Fiber or Plastic as Well as Steel

...that stitches wire through metal, employes in ... saving time and hastening the ... methods engineer,

Using a new ... Buffalo plants of ... date of victory. ... said the first ... over to the "m... shown a week ... hours in assem... which is more ... fast as the pr... riveting and s... Even greate... expected as ... verted to sti... are designed ... tion aid. ... In metal s... only slightl... pin can be ... much as a ... Succ... Less the... after the ...

Assembly of parts 7 times as fast as with riveting is the experience of Curtiss-Wright with the new Morrison Aircraft Stitcher, according to clipping here shown from the March 20th Buffalo News. 428 man hours per week were saved with only one machine, working on five items; saving right from the minute fabricating started with Stitching. Even greater time savings are expected as more parts are converted to Stitching and new ships are designed to fully utilize this production aid. Many important firms are coming to this revolutionary new method of assembling Aluminum, Stainless Steel, Plastics, Cork, Rubber, Asbestos, Wood, Canvas.

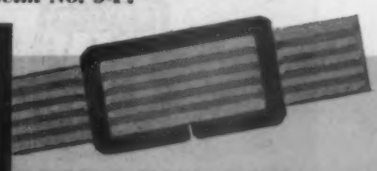
Labor-saving Morrison Stitchers form, clinch and drive stitches in a single operation . . . make clean exit holes with no tearing of metal . . . handle combinations of materials. They are simple to operate . . . only one operator is required . . . no special skill is demanded. They save time because pilot drilling, redrilling, handling of rivets, cleaning prior to spot-welding, etc., are completely eliminated. Vital material is saved, too . . . a five pound coil of wire makes approximately 10,000 stitches. And maintenance is reduced to a minimum because Morrison Stitchers are ruggedly built.

* * *

For further details on Morrison Stitchers—performance records and other information—write today for Bulletin No. 5-F.

MORRISON STITCHERS

PRODUCTS OF THE SEYBOLD DIVISION
HARRIS-SEYBOLD-POTTER COMPANY
DAYTON, OHIO



Above is a cross section view of a Morrison-formed stitch, twice natural size. Note how tightly the wire clamps the material.

LUNCH AT THE JOB
MEANS
BACK ON THE JOB
SOONER!

Bringing food to *the worker* is a step-saving convenience that means greater relaxation . . . even when lunch periods are shortened. PIX PORTABLE CANTEEN was designed for busy war plants where every minute and every foot of space counts. Rolls anywhere . . . brings welcome refreshment to the men on the job . . . solves the lunch-time bottleneck that slows up war production.

PIX PORTABLE CANTEEN keeps hot dishes, soups and coffee *piping hot* by self-contained fuel or electricity—serves sandwiches, drinks, pastry and candy. Made in four models with varying serving capacities. Full specifications are given in our new booklet No. CW8. Send for your copy.

ALBERT PICK CO., INC., 2159 Pershing Road, Chicago
America's Leading Food Service Equipment House

IF IT'S FROM PIX IT'S RIGHT

FEEDING EQUIPMENT
** For War Industries **

THEY SAY AND DO

Manual Explains Absenteeism Plan

Much is being done to combat needless absenteeism. A plan well worth mentioning is that of the Summerill Tubing Company, Bridgeport, Pa., tried out over a period of two years. Under the plan, the highest absenteeism rate has been 2.2 percent. The lowest rate has been 1.4 percent. Bound copies of this plan have been made into an Absenteeism Manual.

In handling absentees, the manual explains that a new employee who loses too much "unnecessary" time is brought into the personnel department and warned. If the condition continues, he is discharged. The old employee who becomes a chronic absentee is also warned, but if it is necessary to discharge him, he is first called before a committee made up of the personnel director, general superintendent, and general department foreman. He is given a chance to state his reasons for being absent and the procedure to be followed is then decided upon.

Anyone absent from work has his time card lifted from the time-card rack, and a red card bearing his name is put in its place. This red time card attracts the attention of other employees to the fact that he is absent. Before the employee can return to work, he must obtain his time card from the superintendent on duty or from the personnel director who points out the necessity for his being on the job. The employee must then take the red card that was in the rack to his shift foreman who can ask for an explanation. By this time, the employee

The statement below is made available for industry's use through Milton M. Hermanson, copy chief of Jasper, Lynch & Fishel, Inc., New York.

The Most Selfish Man in the World — That's Me!

My name is Joe Tompkins, and I'm the most selfish man in the world. I fork over 10 percent of my pay every week for War Bonds. When the government asked me to convert to coal, I converted. I'm a regular customer at the Red Cross blood bank.

When there's an air raid drill, I put out the lights promptly. If I had a patch of land, I'd grow a Victory Garden but, since I haven't, I'm doing the next best thing by arranging to help a farmer on my vacation.

I save scrap, rubber, rags, fats, paper clips. I get a kick out of cleaning and smashing tin cans, and I share my car with my neighbors. I eat nutritious foods so that I can keep well. I'm seldom, if ever, late to work, and I haven't been absent in six years.

I won't spend a nickel for anything I can't use. And I don't join the mob to stock up when the word ration is sounded. When they asked for reading material for soldiers and sailors, I threw in my most cherished books.

I'm not a clock watcher, I don't bear any grudges against my fellow-workers, I try to be careful so as to avoid accidents, and I don't indulge in loose talk. I'm an airplane spotter, belong to the servicemen's recreation committee, and I take good care of my clothes.

If I eat in a restaurant, I won't give my ration stamps to friends—I destroy them. I see to it that my tires are recapped without delay. I won't travel unless I have to, and I don't save coins.

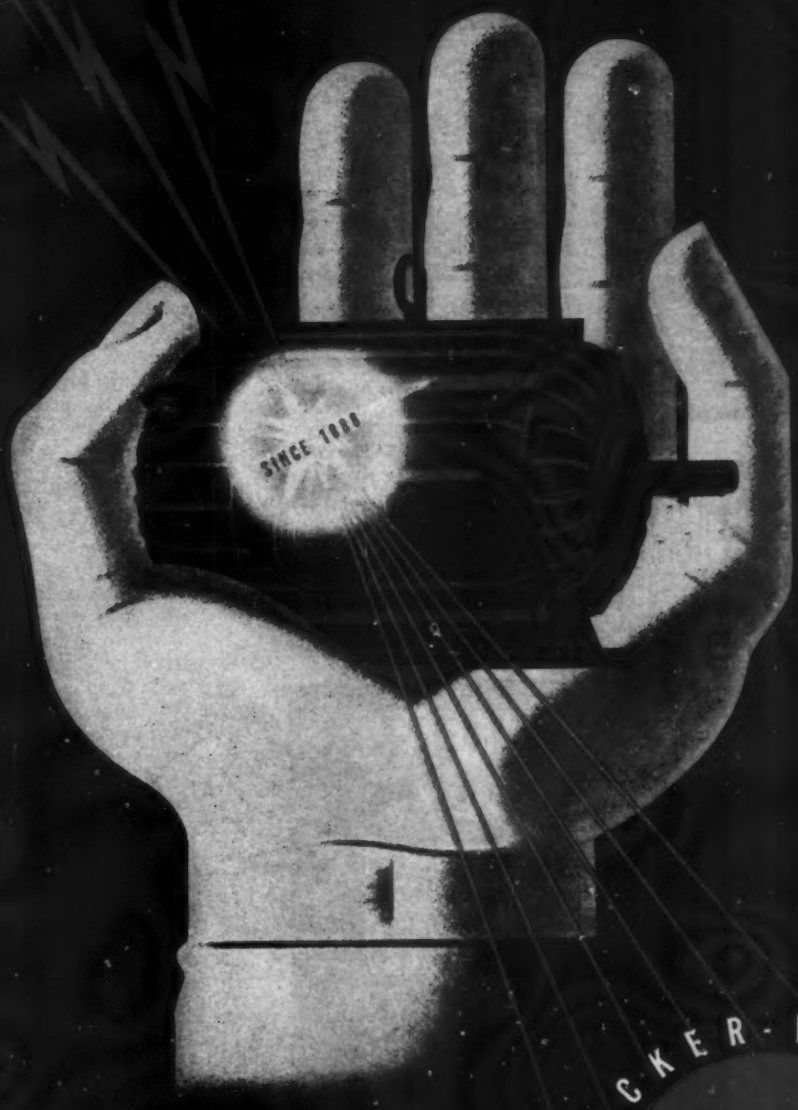
My Congressman hears from me when I have something on my mind. I didn't try to chisel on my income taxes, and I write to everybody I know in the services.

They hauled me into court the other day because I got into a fight with a fellow who was spreading malicious rumors, but the judge said, "Good boy, Joe . . ."

Good boy, hell! I'm the most selfish man in the world. America is my country, and I love every square inch of the good ole U. S. A. I've got a Bill of Rights. I can even be President, or at least an honorary member of the fire department.

So, everything I do—whether it's my 25 cents for a war stamp or my feet going without a new pair of shoes—is done to save what's mine—my country. Maybe I'm crazy, but I've got an idea that if we all took a kind of selfish attitude, if we'd individually accept this war as a personal matter between the "Axis and me," that would pull us closer together. There'd be less squabbling, more teamwork, more everything, and we'd get this over with in a hurry.

NEED MOTORS OR GENERATORS?



IF you need motors or generators, write or wire us . . . or consult your nearest Crocker-Wheeler office. We can make immediate deliveries on some types . . . but regardless of type, we can deliver in faster time than ever before.

New and vastly increased productive facilities, plus expert Joshua Hendy planning are the reasons. Crocker-Wheeler Electric Mfg. Co., Ampere, N. J. Division of JOSHUA HENDY IRON WORKS

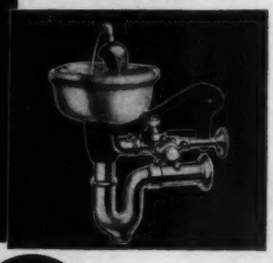
CROCKER-WHEELER

TRADE MARK REG. U. S. PAT. OFF.

Be SURE . . . with
CROCKER-WHEELER

Other JOSHUA HENDY IRON WORKS factories at Sunnyvale, Pomona and Torrance, California and St. Louis, Mo.

...synonym for defeat!



Absenteeism—a subject demanding every production executive's consideration. The man (or woman) who isn't there is a saboteur helping the enemy. You can change the picture by keeping workers contented. Convenient, health-safe drinking water throughout the plant saves steps, saves time, refreshes them when needed!

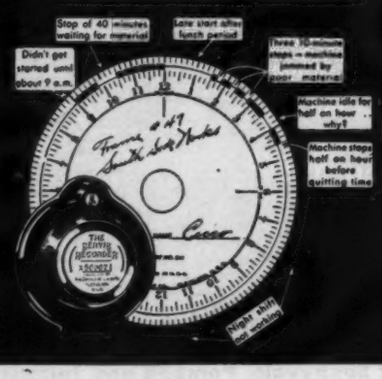
Halsey-Taylor Coolers and Fountains prove their worth the minute they're installed . . . they help worker morale the country over! Pedestal, battery or wall types, electric and ice coolers. Write.

HALSEY TAYLOR
AUTOMATIC STREAM CONTROL • TWO-STREAM PROJECTOR
DRINKING FOUNTAINS

THE HALSEY W. TAYLOR CO.
WARREN, OHIO

MACHINE HOURS
—how to increase same!

Do the obvious thing. Put on *Servis Recorders.* • This little *Servis Recorder* "rides" right on the machine, 24 hours a day. It records on a chart *when* the machine is busy, *when* it is standing idle, and *how long.* Then the chart is laid on your desk. Then you can *really see* your own factory, *see* what's going on! • This very thing is being done today in war plants all over the country. Simple? All worth-while things are simple. The *Servis Recorder* bolts or clamps right on the machine itself—no ink, no pencils, no electric wires. Send for folder—"*A Busy Plant.*" The Service Recorder Co., 1375 Euclid Ave., Cleveland, Ohio.


Stop of 40 minutes waiting for material
Late start after lunch period
Didn't get started until about 9 a.m.
Three 15-minute stops in machine jammed by poor material
Machine idle for half an hour . . . why?
Machine stops half an hour before quitting time
Night shift not working

The SERVIS RECORDER
The "Time Clock" for Machinery

may begin to doubt if the day off was worth the trouble.

By telephone, telegram, through the person with whom an employee rides to work, and personal appearance in the personnel department are accepted methods of reporting off from work. The way in which a person reports is recorded on his absenteeism slip.

Various methods are used in checking absences. Employees reporting off from work are questioned as to extent of sickness and whether under a doctor's care, and are advised to come in if at all possible. The employee not reporting is reached by telephone or by a call from the personnel assistant at his home. Those reporting sick on the job are sent by the foreman to the first aid dispensary. A registered nurse checks each case. Serious cases are sent home. Others are given medical attention and told to report back to the nurse in an hour for another check-up. Leaving the job early to take care of some business is discouraged, but if an employee must leave, the shift foreman makes out a pass for leaving the plant and a form which must be left with the personnel office.

Absences Tabulated

Five specially made up forms are used to tabulate all absences and reasons for absence. Form No. 1, filled out by the shift foreman, is filed for every person who does not work his shift, and serves as a permanent record. A simplified daily report of absences listed under Male, Female, and Total is kept. A monthly report summarizes reasons for absences according to department and cause. Causes for absenteeism are broken into six major reasons: A. Illness, B. Non-industrial, C. Industrial, D. Authorized absence for personal reasons, E. Unauthorized absence, F. Disciplinary time off. All data are simply coded for quick reference. Code 6-A-3 on John Jones's slip, for instance, means that Department 6 had a man out for three days because of illness.

By keeping a constant check of the records and at no time easing up on policing needless absenteeism, the rate of absenteeism for the plant's 1200 employees is kept comparatively low.

•

Industrial Truck Bookings Show Slight Decrease

Domestic bookings of electric industrial trucks and tractors during the month of February, 1943, totaled 284 units, according to figures released by the Industrial Truck Statistical Association. The net value of chasses only booked during this month amounted to $1,305,205.50, compared with $1,639,547.02 in January.

February bookings included 11 non-elevating platform trucks with capacities and chasses base prices ranging from 4000 to 6000 pounds and $1835 to $1998, respectively—a total net value of $23,449; 244 cantilever trucks with capacities and

FOR THOSE DANGER SPOTS IN WAR WORK

DANGER *Acetone*

"De-ion" Motor Watchman for manual motor starting.
(Class I and II hazardous locations.)

DANGER *Naphtha*

"De-ion" Linestarter for magnetic across-the-line motor starting.
(Class I and II hazardous locations.)

DANGER *Coal Dust*

"De-ion" Combination Linestarter for circuit protection and magnetic motor starting.
(Class II hazardous locations.)

DANGER *Gasoline*

Oil-immersed "De-ion" Linestarter for use in corrosive and explosive atmospheres.
(Class I hazardous locations.)

. . . use Westinghouse "De-ion" Controls for hazardous locations

Controls for motors must "make" and "break" circuits safely in spite of explosive atmospheres in ammunition plants, chemical, oil refining and other war industries. Production must be kept moving . . . and safely!

That calls for Westinghouse A-C Motor Control specifically designed for the job.

Cast-iron or welded steel enclosures with heavily reinforced sections and wide sealing flanges are designed in accordance with Underwriters' Laboratories specifications for Class I, Group D and Class II, Groups F and G hazardous locations.* For those applications where it is necessary to resist the effects of corrosive as well as explosive atmospheres, the Westinghouse line includes many combinations which are totally oil-immersed. These are designed in accordance with Underwriters' Laboratories specifications for Class I, Group D hazardous locations. Other design features keep maintenance at a minimum, provide complete accessibility when necessary.

Whether for replacement or for new installations in hazardous locations, specify Westinghouse Controls. Call your Westinghouse representative for his recommendations. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-21271

★ ★ ★

*Class I, Group D hazardous locations are those in which the atmosphere contains gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors, or natural gas.

Class II, Group F and G locations include those in which grain dust, carbon black, coal, or coke dust is present in sufficient quantities to produce explosive mixtures.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MOTORS AND CONTROL

ELECTRIC LIMA MOTORS
LIMA PRODUCTS . . .
ENGINEERED for PERFORMANCE, DEPENDABILITY, and LONG LIFE . . .
MOTORS ½ to 75 H. P.
MAGNETIC POLISHING LATHES
BUILT-IN RECTIFIER FOR D C CURRENT
PEDESTAL GRINDERS
2 AND 3 H. P.
GEARSHIFT DRIVES
1 to 25 H. P.
Large enough to successfully serve you, yet small enough to give personal attention to your needs.
Lima Products, engineered for precision applications, will continuously deliver full rated power performance under the most adverse operating conditions.
To serve American Industry, our field engineers have been specially trained in all phases of motive power application for machine tool and production equipment. Lima Products, plus Lima Engineering Service are the dependable answers to your motor or machine tool production problems.
Many exceptional features such as oversize shafts and bearings, dynamic balancing, heavy rugged frames, etc., are responsible for Lima's outstanding ability for long profitable life.
Wire or write today for address of Lima Engineering Service nearest you.
• • •
Send for new descriptive catalog showing the LIMA line.
DRIP-PROOF 1 to 75 HP
THE LIMA ELECTRIC MOTOR CO.
EXPLOSION-PROOF 1 to 5 HP
867 FINDLAY ROAD
LIMA, O.
U. S. A.
POLISHING LATHES
OPEN
VERTICAL
TOTALLY-ENCLOSED
ELECTRIC LIMA MOTORS
• Standard Drip or Splash-Proof Motors
• Standard Open Motors
• Totally Enclosed Motors
• Explosion-Proof Motors
• Flanged Type Motors
• Gearhead Motors
• Special Types Built to Specifications
• Built-In Motors
• LIMA Gearshift Drives
• LIMA Magnetic Polishing Lathes
• LIMA Electric Pedestal Grinders
• • •

chasses base prices ranging from 2000 to 10,000 pounds and $2220 to $8950, with a total net value of $1,140,941.50; 3 light-duty tractors with chasses base prices ranging from 1600 to 1970, total net chasses value, $49,735; 12 crane trucks with capacities and chasses base prices ranging from 3000 pounds at 7 feet to 10,000 pounds at 5½ feet and $5380 to $8150, had a total net value of $87,075; one special truck with capacity of 600 pounds had a total net chassis value of $4005.

All net values are at factories after additions and deductions for variation from standard specifications and trade-in allowances.

•

For More Man-Hours, Control Venereal Disease

There is no argument with the statement that maximum production is necessary if the war is to be won. But as long as we have venereal disease present in industry in the extent to which it exists today, we shall continue to have a serious depletion of our manpower, one that will prevent our reaching the highest possible production level.

That is the opinion of Thomas Parran, Surgeon General, U. S. Public Health Service, as expressed in a statement recently released. However, the picture is not entirely black, because he presents also a plan that can save American industry millions of man days.

Five groups are involved in an active venereal disease control program: Employers, employees, the medical profession, local health departments, and civic organizations. All must cooperate for the program to be a success. "The methods employed will naturally vary according to local situations," the statement continues, "but, in general, all interested agencies from among the five groups previously mentioned should be consulted to assure agreement on all fundamental phases of policy.

"In addition, a venereal disease program should not be instituted without a complete educational program, since both employer and employee must understand generally the diseases, their causes, spread, cure, prophylaxis, and the fact that under proper treatment infected persons may be employed safely and properly."

Control Program

The control program should include a careful history, physical examination, special examinations as needed, and laboratory tests. Then follows the conference with the applicant or employee whose examination reveals evidence of a venereal disease. Proper advice as to treatment should be given by the physician.

"The next step will fall into one or another of three possible courses, depending upon the local situation: The plant physician may treat the worker; confirmatory diagnosis and treatment may be given

Twenty-four hours a day . . . week in and week out . . . under back-breaking loads . . . with no time out to cool . . . Dayton V-Belts are not only standing the gaff . . . they are actually increasing output . . . reducing maintenance to a negligible minimum . . . saving time and space for industry at war.

Built-to-bend, and to run cool, Dayton V-Belts grip firmly to deliver smooth-flowing, dependable power that cuts power losses and protects irreplaceable machinery.

Near you is a Dayton distributor whose stock of V-Belts is supplemented by strategically located factory warehouses. Call on him for service or helpful conservation suggestions.

THE DAYTON RUBBER MFG. CO.
The World's Largest Manufacturer of V-Belts
DAYTON, OHIO

DAYTON RUBBER EXPORT CORPORATION
88 Pearl Street New York, N. Y. U. S. A.

Dayton V Belts
LIFELINES OF POWER VITAL TO VICTORY

TODAY . . .
a job speeded up is
A job well done . . .
Backstand
Idlers
using
3-M ABRASIVE BELTS and
SEGMENT FACE CONTACT WHEELS
This 3-M Method of grinding and finishing is helping many finishing rooms out of a "jam." 3-M Abrasive Belts have the cutting power to turn out work with speed and when used with a Segment Face Contact Wheel, many items that previously could not be finished by this method due to their shape are now being finished on time.
When today's war effort demands so much speed, checking your methods may prove the answer to increased production.
A 3-M Methods Engineer will gladly cooperate with you by surveying your present set-up and suggesting the type of 3-M Abrasive Belt and Segment Face Wheel to increase your production. These men have wide experience and are proving a definite aid to industry. This service does not obligate you.

MINNESOTA MINING & MFG. CO.

Saint Paul, Minnesota

Gentlemen: FM&M 543

Kindly send your booklet "3-M Method of Polishing and Finishing."

Company.....

Address.....

City..... State.....

Signed.....

Branch Offices BOSTON - BUFFALO - CHICAGO - CINCINNATI
DETROIT - HIGH POINT - LOS ANGELES - NEW YORK - PHILADELPHIA
SAINT LOUIS - SAN FRANCISCO - SEATTLE

by a private physician; or treatment may be given by a public health clinic. Should the worker be employed or his services continued following the examination, the industrial physician should receive a record of his treatment at regular intervals.

"It should be stressed, as the crux of the whole program, that there is no reason why venereally infected persons should be denied work or discharged, if certain provisions are met."

Provisions for Employment

These provisions are (1) the employee agrees to place himself under competent medical care; (2) if the stage of his disease is infectious, employment is to be delayed until a non-infectious state is established; (3) when the disease is in a latent stage, employment should not be interrupted; (4) when disabling conditions exist employment may be deferred or denied; (5) whenever possible occupational readjustments should be made for those who develop disabling manifestations; (6) workers with syphilis, regardless of status, should be excluded from areas of toxic exposure; (7) workers with gonorrhea should be allowed to work only under special medical observation during the administration of sulfonamide drugs.

"Let these things be achieved and a new day will dawn for the American worker and his employer," the statement concludes. "For by such a control program, syphilis and gonorrhea, one the killer and the other the crippler, will be banished from the horizon of industry."

•

Factual View of Absenteeism

Approaching the problem of absenteeism 100 percent from a factual standpoint is "I'm Going to Take the Day Off," an illustrated publication of the Lyon Metal Products, Inc., Aurora, Ill.

Leonard B. Rhodes, manager of advertising and sales promotion explained, "In checking with our employees, we find that back in their minds they have some reasons for staying off. They see things happen around the factory; they don't know the reasons for certain things taking place; the natural assumption is that they can take a day off and it's not going to hurt production." So Lyon hit on some of these points in its publication on absenteeism, and mailed it to the homes of all its employees.

Employer and employee talk it over in this little booklet. When the attendance committee charges that Lyon's absentee record is very bad, one of the employees answers, "Now wait a minute—let's look at the record."

He points out that there are three things that can't be overlooked. In his opinion a check would show that 60 to 70 percent of absenteeism could be laid at the door of 8 to 10 percent of the employees who don't understand how important production is. He feels that some

This advertisement from a previous year, resulted in many a Factory Manager raising employe morale and efficiency that has carried over into the war years.

EMERSON-ELECTRIC *High Velocity* AIR CIRCULATORS

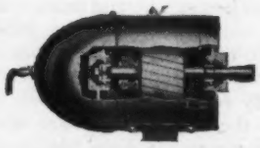
1-SPEED and 2-SPEED, 24 and 30-in. Fans for AC and DC

Improve LABOR EFFICIENCY and COMFORT

...ther your ventilation problem is local... or general... Emerson-Electric Air Circulators keep your workers cool

Emerson-Electric is now engaged 100% in the production of equipment for the Armed Forces. In addition to regular products are Power-operated Airplane Gun Turrets, Shell Parts and Electric Aircraft Motors.

Keeping Up with the Pace of War!



6000 HOURS
Without Re-Lubrication

Emerson-Electric Air Circulators have special thrust-type, grease-packed ball bearings that insure against excessive motor wear.

Whole battalions of Emerson-Electric Air Circulators are massed on the war production front. Backed by 53 years' specialized experience, they are built for long, hard, continuous service . . . It is easy to keep them in fighting trim—ready for the all-out drive against slowdowns and inefficiency that follow hot-weather fatigue. Merely give them the slight care they require . . . Write for Air Circulator Maintenance Instructions if you do not have them available.

THE EMERSON ELECTRIC MANUFACTURING COMPANY

SAINT LOUIS . . . *Branches:* New York • Detroit • Chicago • Los Angeles • Davenport

306

EMERSON ELECTRIC

MOTORS • FANS • APPLIANCES • A. C. ARC WELDERS

It's got something on the ball!

27 sizes with 4-hole head; 15, sizes with ratchet head. 8¾ to 29¾" high, 2 to 19½" lift, 5 to 30-tons capacity.

Self-leveling, drop forged cap "floats" on large chrome-molybdenum steel ball, reducing friction 88%. Safety peephole in unbreakable malleable iron base prevents over-extension of screw. Not just a screw jack—it's a Simplex Jack.

Templeton, Kenly & Company, Chicago

Better, Safer Jacks Since 1899

Make Your Jacks Last Longer!

Proper lubrication, care and handling will do it. Send for a bulletin on the care of jacks.

Simplex LEVER · SCREW · HYDRAULIC Jacks

Filtrine WATER FILTERS

Step Up Efficiency

Crystal-clear water may be rare, especially today when most sources are being severely strained. But your water supply for drinking and industrial purposes will be the way you want it . . . will never vary . . . if you use FILTRINE FILTERS.

Filtrine removes *completely* rust, sand, clay and vegetable matter from water, and lasts a lifetime. Its filter medium, when saturated, can be replaced in two minutes. Guarantee that your water will be in step with the precision of your production line by installing FILTRINE FILTERS now.

For bakery service . . . film processing . . . drinking water . . . for many industrial purposes, Filtrine Filters increase efficiency.

Immediate Shipment

Filtrine MANUFACTURING COMPANY
53 Lexington Ave., Brooklyn, N.Y.

NEW TRUCKS FROM OLD

The reinforced construction of Fairbanks Platform Trucks makes them a veritable fortress for strength and durability.

Even if they become damaged from rough handling, one or all platform boards can be easily and cheaply replaced by removing a few bolts. No welding or cutting is necessary.

Racks, handles and wheels also can be replaced or changed.

Made in styles and sizes for practically every service. Write for catalog No. 51.

THE FAIRBANKS COMPANY
401 Lafayette St., New York, N. Y.

Fairbanks PLATFORM, HAND and BOX TRUCKS

of the men who take a day off just haven't been shown the whole picture. Maybe they think that because the main line works only two shifts instead of three, it isn't such an important job, or that because they stand around occasionally waiting for a transfer or for a machine to be reset, time isn't so important. And third, because the work week is longer, it is harder on the men. Some are off because of real sickness.

A look at attendance charts showed some truth in these statements, but unnecessary absences were still high—so it was put up to the employee—what was he going to do about it. Joe and Frank and George, and some of the others, gave their opinions on "taking the day off" without a good reason. They prefer sticking to the job.

A word from the president of Lyon closes the booklet discussion. "Let's face our responsibility squarely, fellow-employees. Our jobs, and more important than that, our personal part in supporting the war effort and saving the lives of American boys, do not permit 'taking a day off'."

•

New Roles Urged for Scientific Research

American industry has amazed the world by attaining seemingly fantastic goals. To some, the output of our factories has been the one bright spot in this war. In an address before a joint meeting of the Georgia Academy of Science and the Associated Industries of Georgia, Louis Ruthenburg, president of Indiana State Chamber of Commerce and president of Servel, Inc., Evansville, Ind., stressed the importance of scientific research in industry.

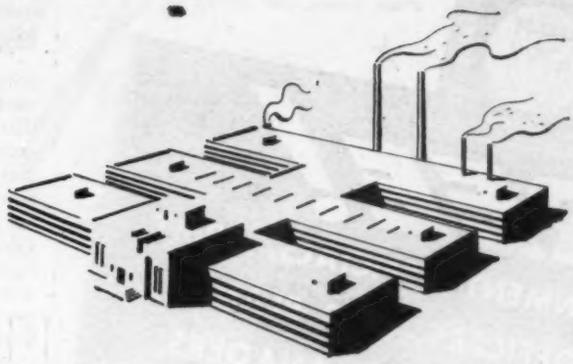
"Fortunately for the safety of this nation," he said, "American industry has remarkable vitality which stems from long established and constantly improved techniques of adapting processes to human capacities and of correlating the activities of human beings . . . and from constantly growing ability to apply the findings of science to the needs of the people. . ."

As he pointed out, American industry was ready to meet war demands because it had the "samples" from which to work. Some two million patents granted prior to Pearl Harbor, and the fact that our people have been trained and are accustomed to invent, gave industry a running start.

Giving examples of the great contributions that have been made to the people of the world through research by way of industry, he touched upon the importance of research in the war effort, upon research as the instrumentality for creating new "patterns," as a creator of the peoples' wealth, and finally observed that research is a most important means for conserving our resources and for insuring the future of America.

A fascinating vista of new products, of new fields in medicine, chemistry, physics,

A BUILDER HAS A BIRTHDAY



THE H. K. FERGUSON COMPANY observes its twenty-fifth anniversary this war year . . . Our job is—as it has been—to design—build—equip large factories—research facilities—power plants—quickly, at low cost.

As in peace times we are small enough to have a major executive in close touch with each project—to adapt our accounting methods to meet our customer's wishes—to keep our overhead low—to get quick action without internal red tape—to keep costs down.

We are large enough to be among the best—to allocate to design, construction and equipment work on each project, men of proven talent and ability, regularly on our payrolls—to make our important customers proud of their association with us—to pay high taxes regularly—cheerfully.

As in peace times, we are consistently breaking records for fine quality—quick completion—low cost. If you have present or post-war problems in plant design, construction or equipment work including research facilities or power plants, our experienced preliminary suggestions should be useful to you without cost or obligation.

The H.K. Ferguson Co.

ENGINEERS AND BUILDERS

CLEVELAND NEW YORK

For More Efficient War Production!

New!

◄This folder describes the newest, most efficient "indoor transportation" of aircraft parts, cartridges, shells, hot tank forgings, bombs, etc.

FREE!

TO U. S. GOVERNMENT OFFICIALS, ARMY AND NAVY OFFICERS, WAR PLANT SUPERINTENDENTS, PLANT MANAGERS, PURCHASING AGENTS, WORKS FOREMEN

►This folder describes the newest, most efficient methods for cleaning cartridges, cartridge links, gun barrels, shells, hardened gun parts, instrument parts, rifle parts, etc.

THESE TWO NEW folders showing how "indoor transportation" problems and metal products cleaning problems have been solved for other manufacturers of war equipment contain many suggestions that are probably applicable to your plant right now—as well as when this war is won.

With a marked advantage because we specialized in assembly line conveyors, shell handling conveyors and cartridge case handling conveyors during the "First World War," A-F Engineers have recently produced conveyor systems and cleaning and finishing equipment which are distinct innovations over previous methods.

WRITE today for either or both illustrated folders.

The Alvey-Ferguson Co., 134 Disney St., Cincinnati, Ohio

CONVEYING EQUIPMENT

Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

radio, and engineering lies ahead. Many now secret "samples" for new industries and for accelerating older industries will be disclosed when the war is over.

"Having learned to apply the processes of scientific research successfully in so many fields of human endeavor, is it vain to believe that some day we may use similar methods to accelerate advancement in other fields equally important to human welfare?" he asked. "What of taxation, for example?"

To Handle Tax Matters

Pointing to the confusion and delay that have resulted over the tax problem, he raised the question of placing tax planning and specific recommendations in tax matters to the Congress within the control of a well-qualified, permanent, non-partisan board.

"What of the enormous task of liquidating billions of dollars worth of war contracts quickly and equitably to the end that reconversion and reemployment by an expanding peacetime industry may not be unduly delayed? What of restoring the flow of capital which long ago ceased to be available in sufficient volume to provide for an expanding economy? . . . Again we have an opportunity to use the non-partisan, fact-finding technique applied by men whose abilities and reputations are above question," he declared.

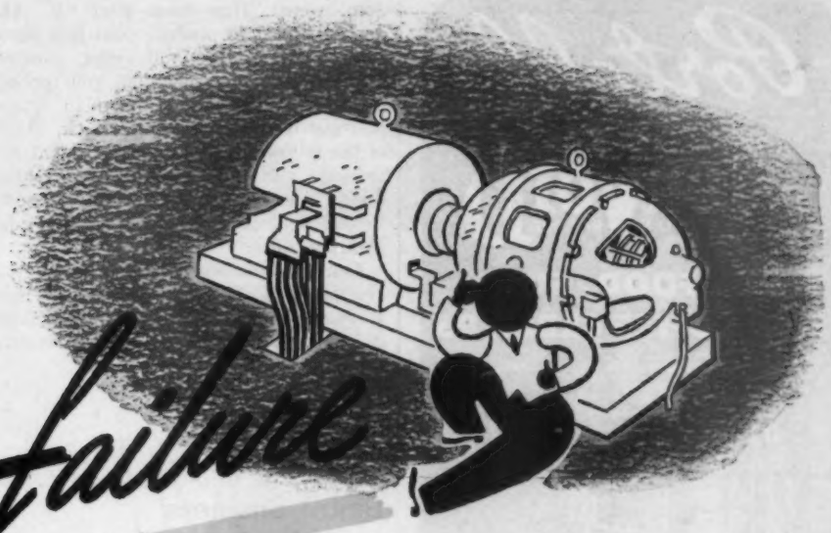
"Much may be expected from the Research Division of the Committee for Economic Planning which will contribute toward the solution of these and kindred problems of such magnitude as to be beyond all earlier experience . . . Its primary objective is to assist and encourage individual business managements to plan for high levels of economic activity and employment after the war. Small business, in particular, will be encouraged and helped to plan now its future operations . . . Business leadership is using sound research techniques in the operations of the Committee . . .

"All thinking people of the United States must lend support to the application of the research method in vitally important areas in which scientific approach has been notably lacking. Here," he concluded, "is an opportunity for developing, through sound research methods, those 'samples' which may bring to the American people benefits beyond computation."

Industry Quizzed on Post-War Planning

Some idea of what industry's views are on post-war planning may be gleaned from the tabulated results of a recent survey conducted by the Research Institute of America, New York. Made among 30,000 industrial executives and professional men, all members of the Research Institute, the survey asked for answers to 26 problems that, among others, will probably face a post-war industrial world.

Some of the questions, taken at ran-



Friday's failure

MAKES GUN MOUNTS ON TUESDAY

FRIDAY THE THIRTEENTH, 9:00 A.M., ARMATURE FAILED IN 1500 AMP. MULTIPLE-OPERATOR WELDER. LOST PRODUCTION FOR 15 MEN. WELDER DELIVERED TO WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT. NEW COILS FORMED, INSULATED AND TREATED. ARMATURE REWOUND. NEW EQUALIZER MADE AND INSTALLED. TURNED AND POLISHED COMMUTATOR. TUESDAY, THE SEVENTEENTH, 8:00 A.M., BACK ON THE JOB TO MAKE GUN MOUNTS FOR SMACKING THE AXIS.

Westinghouse

DISTRICT MANUFACTURING AND REPAIR

J-90463

IF **THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

Portable
AERVOID
REG. U.S. PAT. OFF.
HOT FOOD, SOUP AND COFFEE CARRIERS

Complete servicing units in themselves or can be incorporated into mobile canteens.

for servicing workers *near their work*

Industrial war plants, shipyards and aircraft plants, munitions and loading plants, are finding necessary PORTABLE equipment for transporting hot foods and liquids to workers NEAR THEIR WORK. Immensely increased personnel, wide-spread operations, overcrowded cafeterias, many workers far from cafeterias, are necessitating de-centralizing war-plant feeding operations and a need for portable equipment in which hot foods and liquids can be kept hot while being transported anywhere indoors or outdoors throughout the plant.

Over 100 large war plants already have AerVoiDs in service and doing a job no other equipment can do so efficiently and with such small expenditure of critical materials, small upkeep, low operation cost.

How and why AerVoiDs are going into war plants in constantly increasing numbers, in the words of the users themselves, is told in a new circular.

Ask for circular FM 1-43

VACUUM CAN COMPANY
25 S. HOYNE AVENUE - CHICAGO

dom, were, "How soon after "V" Day do you expect to produce your first peacetime product?" "Will your post-war prices be more or less than your pre-war prices?" "How do you plan to finance post-war reconversions?" "Which, if any, of the following war-time government controls do you think should be continued during the post-war transition period?" Possible answers were listed for quick checking off.

One question which got a "Yes" grand average of 97 percent was, "Do you think a business firm should start planning its adjustments for post-war operations now?"

•

Small Business and the Buyer

Although two years too late, the effort to save small business is not hopeless, Col. Robert W. Johnson, chairman of the Smaller War Plants Corporation, told a group of small business representatives recently assembled in Washington, D. C., by the Research Institute of America.

The only "if" in this hope for saving small business was whether some 15,000 to 20,000 buyers, representing federal and local governments and prime contractors, could be made conscious of the problem.

"If these buyers would change their frame of mind," he said, "the problem would be solved in 90 days."

"The smart buyer will distribute his orders to as many firms as possible. . . Big business will find after the war that the existence and success of small business may save the whole situation."

Giving many instances of the value of small plant management, he stated that the use of small plants should be encouraged by orders not only from all branches of the federal and local governments but from the prime producers of civilian goods as well.

"We will put them in touch with each other if the buyers for the big fellows will only assume the proper mental attitude," he said.

•

Copper Gets in the Scrap

The call has now gone out for copper scrap as well as iron and steel scrap. In a brief summary of the reason for the immediate need of a greatly increased flow of copper, brass, and bronze scrap, the Business Press Industrial Scrap Committee, New York, states that only one-fifth of copper scrap refining capacity is now operating and that industry is called upon by WPB to produce 62½ percent more scrap than in 1942.

The flow of almost pure scrap, known as Number One and Number Two grades, is diminishing so rapidly that the gap must be filled by other less pure grades which must be refined before they can

save

twice

THE SAME Laminum shim that cuts assembly time 20 to 30 percent again saves *repeatedly* in making precision adjustments . . . for the life-time of the machine!

Laminum shims—.003 or .002 inch brass laminations bonded into a solid unit (easily peeled)—are cut to your specifications.

Stock shim materials are supplied by industrial distributors. Write us for sample and illustrated shim application chart

Laminated Shim Company
Incorporated
54 Union Street Glenbrook, Conn.

it's
LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

LISTEN TO THE SONG OF A NATION'S FURY!

This is the song of America with the big shoulders. America with hands and brains and power. With wheels turning, dynamos driving, pistons pounding. With great rivers pent-up in in its dams, and a billion engines hauling freight . . . digging coal . . . splitting timber . . . pouring steel . . .

This is America today. This is America with the throttle wide open, all-out for Victory.

Behind the staggering spectacle of war production is the basic force that sustains the whole enterprise—and makes it possible . . . *OIL POWER!*

With factories operating on 24-hour schedules . . . with less time for overhauls . . . and with replacements scarce . . the hazard of machine breakdown is increased a hundredfold. It is of vital importance, therefore, to protect mechanical equipment—and to insure steady, smooth production with *Precision-Perfect*, service-proved lubricants.

Whether your job calls for one or many types of lubricants, Cities Service is ready to serve you with top-quality products and expert counsel.

Get in touch with your nearest Cities Service office—*today!*

In war as in peace, Cities Service remains dedicated to the same ideal . . . *Service to the Nation!*

OIL IS AMMUNITION—USE IT WISELY!

CITIES SERVICE OIL COMPANY
NEW YORK · CHICAGO

IN THE SOUTH
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.

Pump Aids of 1943

BULLETINS by BLACKMER

FREE TO USERS OF ROTARY PUMPS

Your "pump file" IS NOT COMPLETE without them.

FACTS ABOUT ROTARY PUMPS

Design and operating data on swinging-vane type pumps. Ask for Bulletin 301.

ENGINEERING PUMP DATA

Quick answers to pumping and piping problems. For Engineers. Ask for Bulletin 302.

BLACKMER CATALOG

A 24 page catalog illustrating types of hand and power pumps for various industrial uses. Ask for Bulletin 130.

MARINE PUMPS

Complete data on Blackmer Rotary Marine Pumps, both power and hand operated. Ask for Bulletin No. 120.

HOW TO MAKE PUMPS LAST LONGER

The 10 commandments of rotary pump maintenance. Card punched to hang near pumps. Ask for SER-1.

POWER PUMPS: Capacities 5 to 750 GPM. 300 psi.
HAND PUMPS: Capacities 7 to 25 GPM. 54 models.

Blackmer Nation-wide Pump Engineering Service awaits your call on any problem involving rotary pumps.

Write Blackmer Pump Company, 2105 Century Avenue, Grand Rapids, Mich.

BLACKMER Rotary PUMPS

"BUCKET DESIGN"—SELF-ADJUSTING FOR WEAR

be used. Shortage of "less pure" grades is acute, too—scrap refineries received only 4800 tons of these grades in 1942.

To ease the scrap shortage, the salvage division of WPB appeals to industry to make up a forecast deficit of 625,000 tons of refinery brass and copper-bearing materials in 1943. This amounts to approximately 52,000 tons a month more than the 1,000,000 tons collected in 1942.

•

Campaign Against Off-the-Job Accidents

Another front is being opened up in the war against needless absenteeism. An ambitious campaign against off-the-job accidents has been launched by the National Safety Council, Chicago, to reduce the accidents that are doing so much to hinder the war effort.

Col. John Stilwell, president of the Council, asserted that off-the-job mishaps are as preventable as work accidents and that their prevention is just as vital to victory. "Our chief job is combating off-the-job accidents is educational," he said. . . . "Any worker can keep himself safe and on the job."

In 1942, a total of 29,000 workers met death in off-the-job accidents as compared with 18,500 killed at work. Of 4,100,000 non-fatal injuries to workers, 2,350,000 occurred off the job. Man-hours of work thus lost by accidents could have built 12,600 bombers.

A series of six leaflets, based on techniques and methods that have proved effective through the years in preventing accidents in industrial plants, have been prepared for distribution to workers. Emphasizing each person's responsibility for his own safety, they contain specific information as to how workers may stay safe at home, in traffic, everywhere.

Twelve posters, each dealing with a specific off-the-job hazard, have been prepared for display in plants. The slogan runs "Stay on the Job. Manpower is Warpower."

A series of 30 cartoons, together with articles, are being made available without cost to any industry asking for them. Pamphlets and data sheets are being offered, too.

Sound-slide films, "No Time For Goofers" and "Safe All Around," are also being used to bring the off-the-job safety story home.

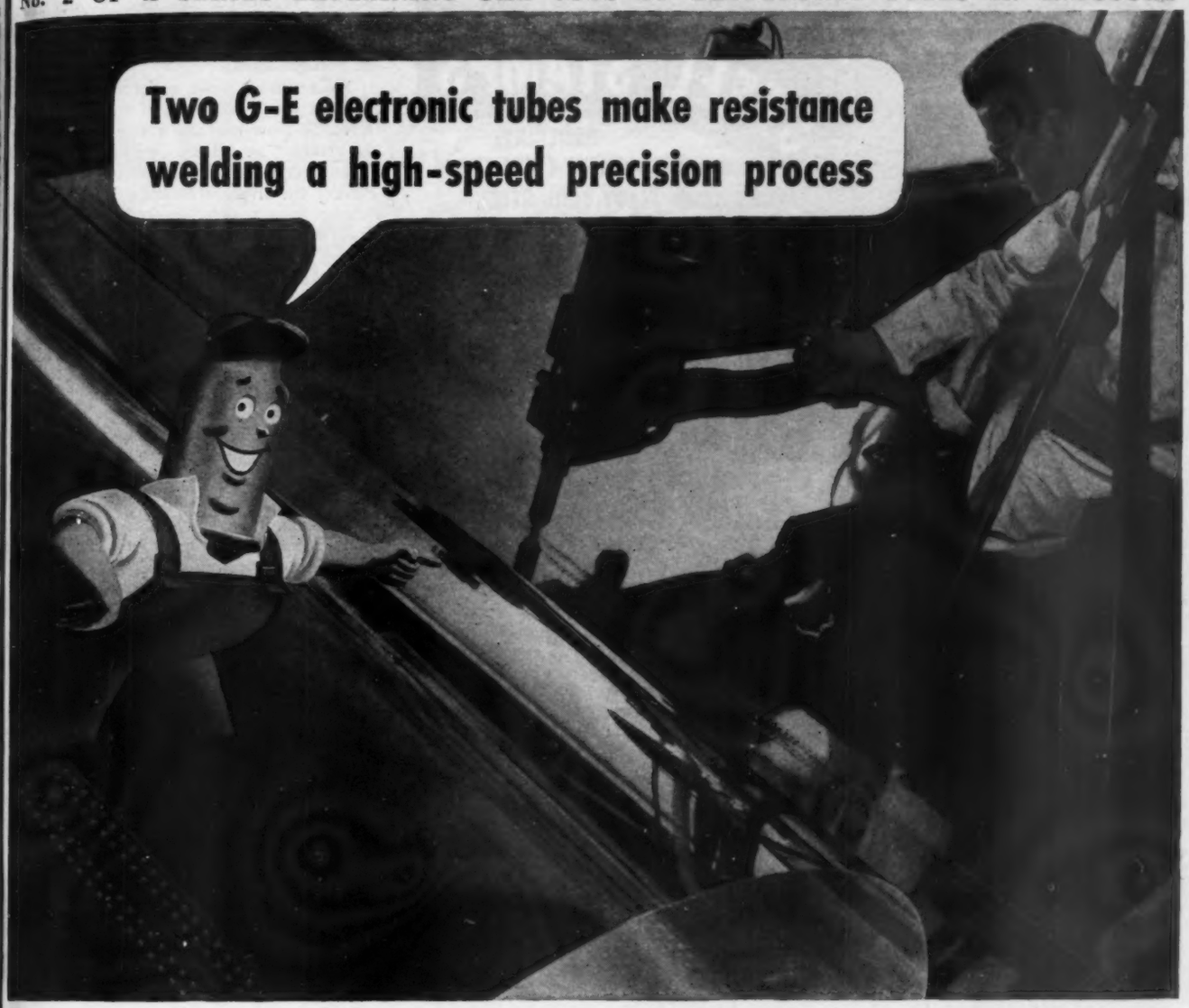
•

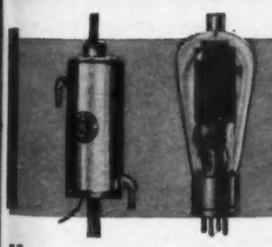
Warning Against Super-Statism

The United States will play an important role in the peace and post-war development of the world. To play that part, Eric A. Johnston, president of the Chamber of Commerce of the United States of America, states we must be a down-to-earth, vigorous nation unhampered by dissension at home. In a recent

No. 2 OF A SERIES EXPLAINING THE USES OF ELECTRONIC TUBES IN INDUSTRY

Two G-E electronic tubes make resistance welding a high-speed precision process





Without the ignitron and the thyratron, today's high-production resistance welding of aluminum and stainless steel would not be possible

METALS such as aluminum and stainless steel, once difficult or impossible to weld, now may be fused easily in spot welds — or in a neat seam (as in the production of the Boeing Flying Fortress) at a rate as great as seven feet per minute and at a fraction of the cost of riveting or other means of fastening.

This operation utilizes two types of electronic tubes. The ignitron is the *power tube*. Sturdy and steel-jacketed, it provides the high current which applied for a fraction of a second fuses the metals permanently.

The thyratron is the *precision timer*. This automatic switch controls the passage of the heavy welding current, supplied by the ignitron, with an accuracy of 8 thousandths of a second.

Together, ignitron and thyratron provide power suited for welding loads that range from thin aluminum parts to heavy slabs of steel. In any range, they offer uniform control, dependability and high production.

It is the purpose of the G-E electronic tube engineers to aid *any* manufacturer of electronic devices in the application of tubes. General Electric, through its nation-wide distribution system, is also prepared to supply *users* of electronic devices with replacement tubes.

We will be glad to place interested men in your plant on our electronics mailing list. For example, we would like to send a full color spectrum chart showing typical electronic tubes and applications. Write on company letterhead. *Electronics Department, General Electric, Schenectady, N. Y.*

• *Tune in on Frazier Hunt and the News every Tuesday, Thursday, Saturday evening over C.B.S. On Sunday night listen to the "Hour of Charm" over N. B. C. See newspapers for time, station.*

GENERAL ELECTRIC

162-84-6850

"Safe-Hed"* STEEL STAMPS

IMMEDIATE SHIPMENT FROM STOCK
ALLOY TOOL STEEL
ALL SIZES
MADE FOR 90% OF MARKING NEEDS

* REG. U. S. PAT. OFF.

Write for Cat. 146-A!

JAS. H. MATTHEWS & CO.

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Branch Plants
New York, Boston, Chicago, Philadelphia, Newark, Syracuse
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SUPERIOR TOOLS
can be expected only from
SUPERIOR TOOLMAKERS
The DIEMAKER
The MACHINIST
The INSPECTOR
are no better than their eyes

Can they be spared five minutes from their jobs to check their visual efficiency?

KEYSTONE INDUSTRIAL VISUAL SAFETY (IVS) TESTS

screen out the visually inefficient and automatically classify employees as to their visual fitness.

They detect the probability of visual inefficiency due to conditions correctible by glasses, such as low visual acuity, astigmatic errors, and approaching presbyopia; and others which may not be so readily controlled, such as color blindness, lack of stereopsis, and improper eye co-ordination.

Write for
IS YOUR BUSINESS BLIND, which contains a partial list of nationally known users of the IVS Tests.

KEYSTONE VIEW COMPANY
Industrial Division
Meadville, Pennsylvania

IMMEDIATE SHIPMENT
on this sturdy, 100% accurate
COUNTER

Model AR

for punch presses and screw machines
—conveyor or production lines
—can making machinery
—case sealing machines
—pumps
and other types of equipment
Write for full details

F. B. REDINGTON CO.
105 So. Sangamon St. Chicago, Ill.

address before the Institute of Arts and Sciences, Columbia University, he spoke on "The Road to Realism," later printed in booklet form.

"We cannot make a decisive contribution to a normal world if we allow ourselves to grow fatalistic and unambitious," he stated. ". . . There are men—honest, highminded men—who think they are raising the living standards of the world when they merely succeed in lowering the living standards of America. They forget that we Americans have been able to make the magnificent contribution of our industrial strength toward winning the war . . . because we were rich, industrious, and economically free. . . . We shall be able to weight the post-war scales in favor of peace and prosperity for mankind only if we continue to preserve and strengthen the economic system which gave us that capacity."

Enlightened Self-Interest

Preferring the language of enlightened self-interest, he called on Americans to muster enough realism and courage to assert plainly that "we do not propose to preside over the liquidation of the American system of life," and not to be squeamish about admitting this is a self-interest approach.

Warning against the danger that our country might go totalitarian, he said that a watch must be kept for any tendency to put more and more authority into the hands of any government—particularly into the hands of our government.

Noting in any partnership between an all-powerful government and a business organization that the private side of the combination inevitably becomes the silent, helpless partner, he urged Americans to keep their healthy distrust of "big government" as their greatest defense against super-statism.

"Super-statism is not a bogey of business men's imagination," he declared. "It is the monster which has catapulted the world into war . . . our opposition to it must be active, not passive." Many problems have been created by modern industrialism, and one thing is certain, he said, ". . . Business and management must be given the opportunity—the freedom—to solve those problems. They cannot do so if they are hampered by needless restrictions—nor if the incentives to initiative are destroyed.

Challenge to Genius

"Shall we admit that the American genius for organization, which has given the world the techniques of mass production and made our living standards the envy of all other nations, cannot solve the problem of an equitable distribution of the abundance we can produce? Shall we resign ourselves to compulsive distribution by a super-government?

"American productive genius, as represented by both capital and labor, must put its best minds and its best energies on the job to plan production that will mean work for all—then there will be no need

AAF filters war on dust at the front as well as at home

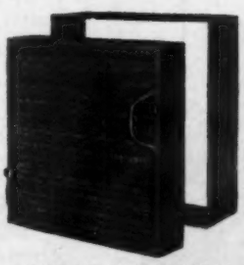
On every front line airport, as in every war industry at home, the daily battle against dust never stops.

In Tunisia, on Guadalcanal—wherever our war planes operate, airplane motors not protected from dust by air filters require overhauling and rebuilding after only 20 to 30 hours flying time. When equipped with AAF filters which remove 90% to 99% of the dust from the intake air, engines perform efficiently from 300 to 400 hours!

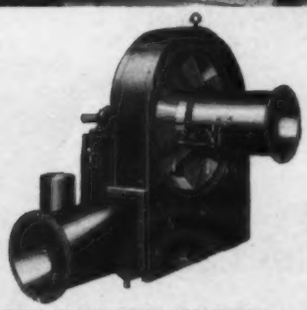
On the home front dust is an equally vexatious problem. Costly machinery must be protected against excessive wear—materials in process must not be spoiled, and worker efficiency must be maintained. Until the advent of war, the control of industrial atmospheric and process dusts was considered desirable but not vital. But war has changed many things, and today, *dust engineering* has assumed its rightful place as an essential part of production planning.

If you have a troublesome or dangerous dust condition in your plant, write us about your problem. Send for "AAF In Industry", a new booklet describing the complete line of AAF equipment.

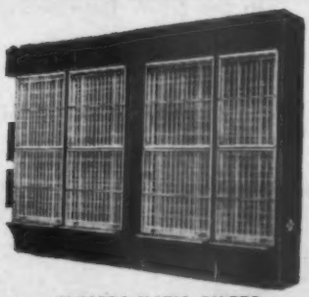
AIRMAT DRY TYPE FILTER



VISCOUS UNIT FILTER



ROTO-CLONE DUST COLLECTOR



ELECTRO-MATIC FILTER

AMERICAN AAF AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 361 CENTRAL AVE, LOUISVILLE, KY.
INCORPORATED
IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

NEW CASTER MANUAL

The Rapids-Standard Caster best adapted for your job will fairly roll out to meet you as you look over the pages of this new Caster Manual.

★ Forty pages of over 200 different models of Casters all in full colors to choose from . . .

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★ How to select the proper Caster.

★ 18 Accepted Methods of Mounting Casters.

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for handouts. . . . Our very survival as a free nation depends on how and how soon we accept this challenge. The alternative is a super-state, the decay of the American system, the beginning of a cycle of tyranny and impoverishment such as other nations have experienced when the individual was superseded by the state.

"The 'roads to world peace' are blocked," he concluded, "every time that another totalitarian state is born. They will be hopelessly blocked if America should lose the vitality and resilience that derive from its institutions of incentive economy."

•

Labor has dug up another old bone of contention to gnaw on in the efforts of the National Labor Relations Board to push the pre-war fight for unionizing foremen. Inflamed Raymond Moley, writing for the Chicago Journal of Commerce, condemns it as a threat to this nation's victory in the war.

Quoting C. E. Wilson, president of General Motors, who recently put the issue squarely before Congress with the charge that unionizing foremen would destroy the discipline necessary to efficient production, Moley supported management's argument.

"The ultimate result of the NLRB policy will be to freeze top management in helpless isolation. This is worse than socialism; it is chaos, for the regime thus created will have no heads at all. It will consist," he said, "of a great many small authorities responsible to no one and, in many cases, in bitter conflict with each other."

•

Extra Stamps for Safety Shoes

"Safety" shoes can now be bought on short notice even if ration stamp 17 has been spent by the employee. An amendment to Ration Order 17, effective April 5, 1943, permits employers to get stamps for safety shoes for protection of workers. Any employer whose plant is not served by a Plant Area Board may make written "application to, and upon approval obtain from, the District Office the number of special shoe stamps (or temporary shoe purchase certificates) necessary to allow the acquisition by his employees of a two month's supply of safety shoes."

Stamps acquired under amendment Section 1.7a must be issued to employees through a person or committee appointed by the employer and approved by the District Office. Stamps issued are to be marked with the date of issuance and the

AS QUICK AS SHE CAN SAY JACK ROBINSON . . .

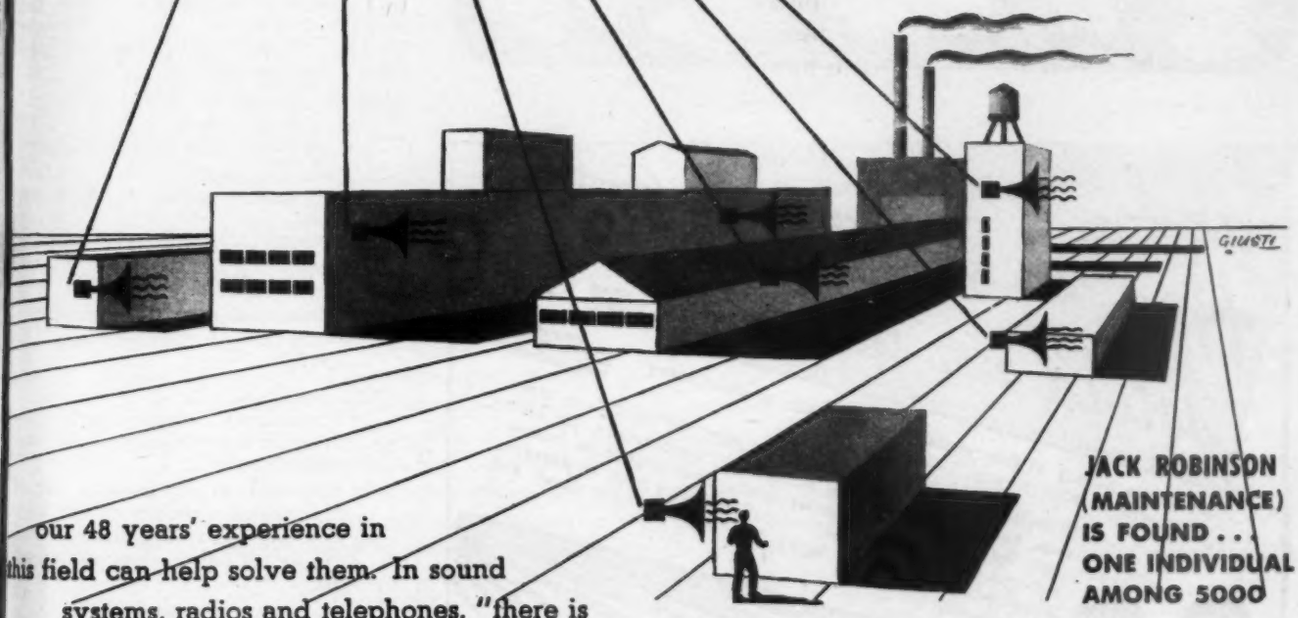
There's a break in the power line . . . and Jack Robinson is lost in the acres of machinery.

Yet he's found in a flash—thanks to Straight-Line Communication.

It's a shotgun that can't miss . . . it reaches individuals, groups, or the entire plant quickly, clearly.

But the amazing thing is that many modern plants still rely on time-wasting indirect methods of communication—despite the fact that paging by Straight-Line Communication does it better and quicker than by any other means. It more than pays for itself in a short period of time.

If your factory or plant has any communications problems whatever . . .



JACK ROBINSON (MAINTENANCE) IS FOUND . . . ONE INDIVIDUAL AMONG 5000

our 48 years' experience in this field can help solve them. In sound systems, radios and telephones, "there is nothing finer than a Stromberg-Carlson." Why not get in touch with the Sound Systems Division of the Stromberg-Carlson Company, 100 Carlson Road, Rochester, New York. Write for free booklet No. 1936.

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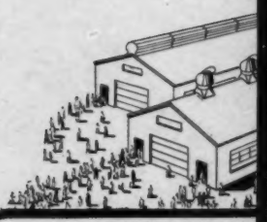
STRAIGHT-LINE COMMUNICATION SAVES MANPOWER • SPEEDS THE WORK TO VICTORY



How to add 500 Man hours per week without Extra Employees!

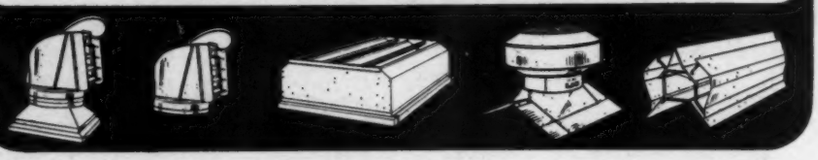
(Example for 500-Man Shop)

Startling results in improved production are secured when you provide *better ventilation* for your workers. . . . Whether you have 500 employees—or less—or more, the formula remains the same: If 500 48-hour workers in your plant gain *only slightly more than* 2% in personal efficiency, you have the equivalent of 500 added man hours per week. Even an elaborate system of ventilation quickly pays for itself in actual production secured. Controlled, efficient exhaust of heat, stale air and smoke can be accomplished *quickly,* economically with

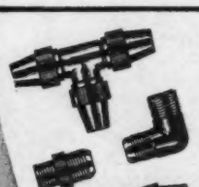
Swartwout ROOF VENTILATORS

Two complete lines in steel or non-critical materials. . . . Free engineering help. Write the factory or contact nearest representative.

THE SWARTWOUT CO., 18511 Euclid Ave., Cleveland, Ohio



"and Hodgman Saran solved our problem"



When the history of this period is written, this is what many firms will be able to say.

HODGMAN SARAN TUBING, PIPE AND FITTINGS are more than substitutes—they are permanent replacements for strategic materials such as copper, brass, steel, aluminum, rubber, etc. and deserve a thorough investigation by your engineering department. . . . Write today for technical data sheet and free sample.

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number of the employee's War Ration Book, or with the words "No book" if he does not have one. A stamp is issued only to an employee who has filled out an application under section 1.5 and who meets the requirements of this section.

When the initial supply of certificates runs low, the employer can secure more by writing to the District Office, stating the number he has on hand, and sending for review the applications against which the company representative has issued certificates.

•

This War Needs Professional People

Names of men and women qualified for high-grade professional jobs are being requested every day from the National Roster of Scientific and Specialized Personnel, now a part of the Bureau of Placement, War Manpower Commission, Washington, D. C. Approximately 25,000 Roster registrants have been placed in government and war industry, and commissioned in the armed forces since 1941. In a number of fields the Roster has almost complete coverage.

Demands have been heaviest for people trained in engineering and the physical sciences. In an endeavor to learn how many professional people (whether previously registered or not) are presently available for employment, the Roster has issued this statement:

HAVE YOU PROFESSIONAL TRAINING OR EXPERIENCE IN:

1. Engineering and/or related fields?
2. Physical sciences?
3. Agricultural and/or biological sciences?
4. Medical sciences and/or related fields?
5. Social sciences?
6. Administration and management?
7. Humanities—foreign languages; philosophy?

AND ARE YOU:

1. Unemployed, because construction work has been stopped, or for other reasons?
2. Employed in less-essential activity and seeking a transfer to war work?
3. Working, but feeling that your abilities are not fully used on your present job?

WRITE A LETTER NOW TO:

The National Roster of Scientific and Specialized Personnel
War Manpower Commission
Attention: Qualifications Section
Washington, D. C.

IN YOUR LETTER STATE:

1. Whether you are now available for employment.
2. Types of work you are qualified to do.
3. Conditions under which you will accept employment.
4. Whether you are or are not already registered with the Roster. If you are not already registered with the Roster, state your field or fields of specialization and request registration papers.

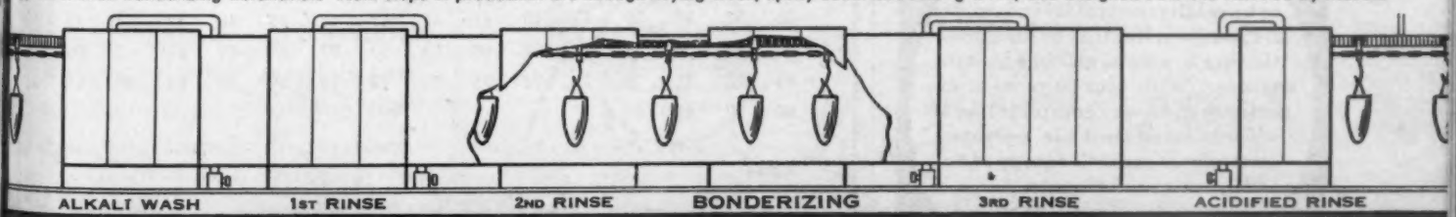
LET Mahon EQUIP YOUR PLANT FOR BONDERIZING

Bonderizing solution is sprayed against every surface of work being processed as it passes through on conveyor.

Mahon Bonderizing Equipment is built to fit your plant and product. All details of installation—type of conveyor — heating — controls, etc. — are given individual consideration.

Bonderizing long has been accepted as an outstanding method of producing an effective bond between paint and steel—and as a rust repellent. For as many years as the process has been in use, Mahon engineers have been planning, producing and installing equipment essential to its proper application. Hundreds of Mahon-engineered installations are now in operation—adapted to every conceivable size, shape and type of product. War requirements have tremendously increased the need for bonderizing—and the demand for Mahon equipment. If manufacturing specifications call for the bonderizing of your product, let Mahon design and build the equipment you'll need. Whether your product is large or small—whether you require a bonderizing unit to fit into your present production line—or whether you desire a completely new and modern finishing system—the knowledge and experience of Mahon engineers will prove immensely valuable. Production will be placed on a fast-moving, highly efficient and economical basis.

Typical Mahon Bonderizing installation. Next steps in production are through Drying Oven, Spray Booth and Baking Oven, also designed built and installed by Mahon.



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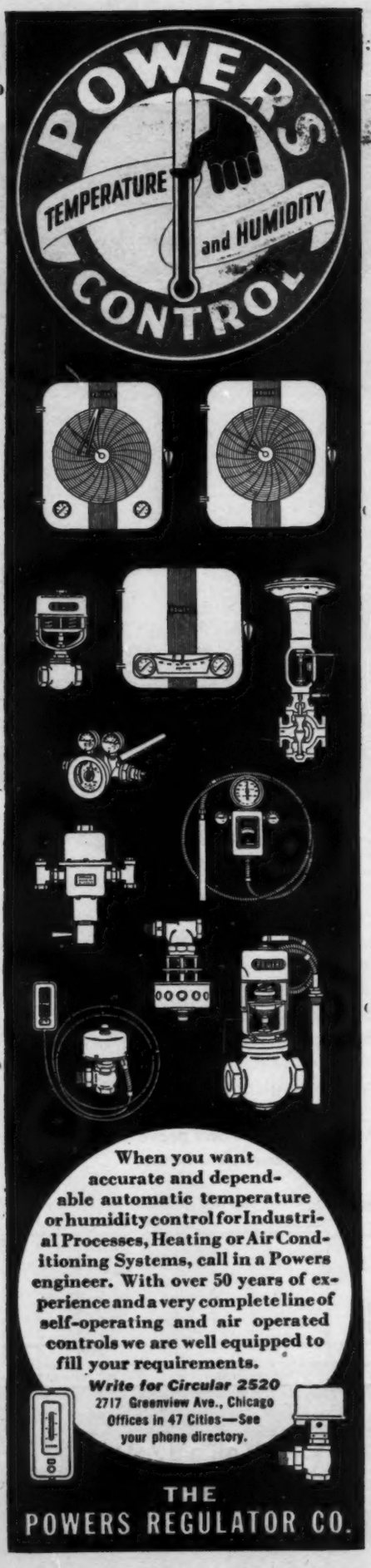
Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems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When you want accurate and dependable automatic temperature or humidity control for Industrial Processes, Heating or Air Conditioning Systems, call in a Powers engineer. With over 50 years of experience and a very complete line of self-operating and air operated controls we are well equipped to fill your requirements.
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Offices in 47 Cities—See your phone directory.
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"AIRCRAFT ALLOY STEELS"—is title of combined stocklist and data book designed as guide to aircraft steel stocks, prices, sales limitations, and specifications. Joseph T. Ryerson & Son, Inc.

–2–

AIR EXPRESS—"Wartime Wall Chart" details up-to-date information regarding air and air-rail service available to shippers throughout the country. Gives typical airplane floor plan, shows what can be shipped by air express, typical examples of rates and time. Air Express, Division of Railway Express Agency.

–3–

"ALLOY METALS–Finding List and List of Sources." First in a series of bulletins on alloy metals that offers special information on new developments in metals to help engineers, metal workers, and purchasing departments, compiled as a contribution to the progress of the welding industry. Hobart Bros.

–4–

AUTOMATIC CONTROL EQUIPMENT–Bulletin 720 gives details of construction, latest improvements, applications, and prices of magnetic contactors, reversing co automatic reset timers, remote c switches, etc. Zenith Electric Co.

–5–

AWARD EMBLEMS—Six different em are pictured in 4-page pamphlet—award increased production, no lost time, a tions, Army-Navy "E," long service r apprentice school graduates. Bastian Bro

–6–

AWARD PLAN–Four mimeographed give brief outline of coordinated plan is claimed to simplify and tie all the p tialities into one merit award system. Emblem Co.

–7–

BATTERY-CHARGING—Automatic bat charging equipment for motive-power batt is subject of illustrated 8-page bulletin, G 3923. Describes single and multiple c battery controls, motor-generator sets, cha control units, and open and closed co panels. General Electric Co.

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"BEYOND A SHADOW—of a Doubt" title of 18-page booklet intended to

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FACTORY MANAGEMENT & MAINTENANCE (May, 1943)
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Please have manufacturers send me, without obligation, literature below.

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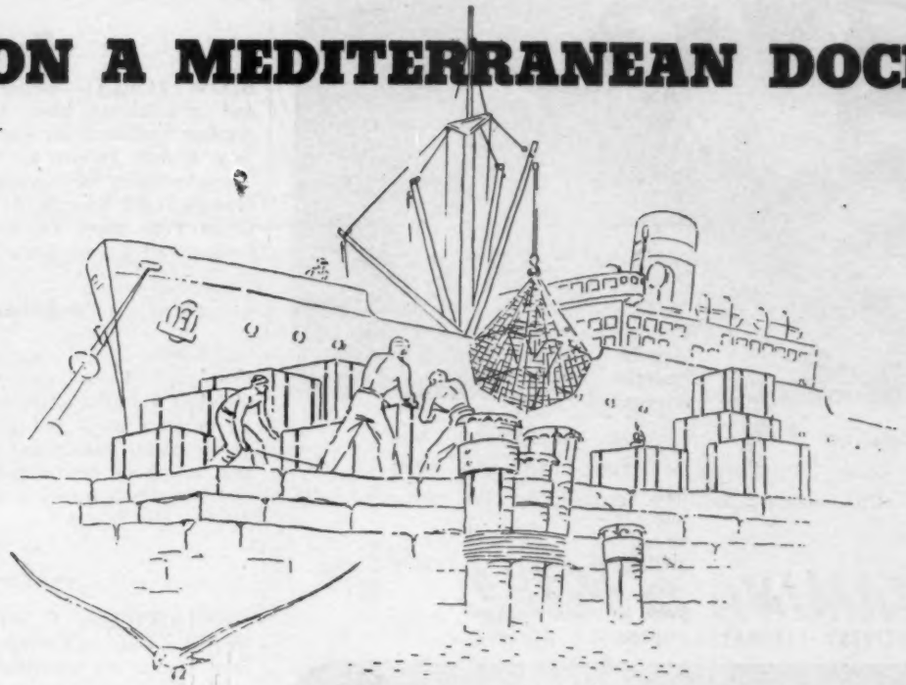

THE report *"arrived safely"* is the best evidence of substantial support for an aggressive army waiting for materials and supplies.

It means that the drives for more and faster production are getting results, *where they really count.*

Safe arrival is dependent on *planned packing* as well as on men, trucks, freight cars and ships.

Acme engineers, co-operating with Government officials and manufacturers, are assuring adequate protection for the overland and overseas shipment of practically every type of war product.

The Acme Steelstrap Process also is used effectively to conserve carloading space and to reduce tare weight to a minimum. And, meeting all Federal Strapping Specifications, Acme Steelstrap applied with Acme Tools provides a faster, more economical way to move parts and products from the production fronts to the fighting fronts. If you are producing war materials, an Acme engineer will be glad to help you plan for their faster shipment and safe arrival. Contact the nearest Acme office for complete information.

★ Acme Process News is an interesting 12 page publication showing many unusual war strapping applications. Copies on request.

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ACME STEEL COMPANY, General Offices: 2831 Archer Avenue, CHICAGO, ILLINOIS

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Abbott Bearing Balls, in your assemblies, will safeguard your Standards of Precision and help to assure the dependability expected of your products.

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This J&J General Utility Truck is built to "get around" easily. Use it for a pick-up truck in plant cafeteria, and for serving sandwiches and other food items throughout the plant. Write for complete information and prices.

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Heavy Duty General Utility Truck with two wooden trays—No. 1472

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SUPERIOR *Noiseless* TRUCKS

MOUNTED ON J&J SUPERIOR CASTERS

sent the advantages and possibilities of inspection and measurement by optical projection. Profusely illustrated with examples of various parts and products inspected with Optical Comparators. Jones & Lamson Machine Co.

–9–

BLOW TORCH—Instructions for operating and maintaining blow torches and other gasoline appliances are given in series of one-page leaflets known as "Torchy Theater." Three subjects are presently available—(1) How to Light Your Blow Torch; (2) How to Clean Your Blow Torch; and (3) How to Solder. The Turner Brass Works.

–10–

CASTERS—Two 4-page bulletins, "Floating Hub" and "Floor Truck Lock." The former describes a hub construction that is claimed to protect floors and smooth out bumps by absorbing shocks; the latter shows a lock that is applied and released by a foot lever and keeps floor trucks in place without caster brakes. The Bassick Co.

–11–

CENTRIFUGAL PUMPS—"Handbook for Wartime Care of Centrifugal Pumps" shows how pumps are constructed, how a change in liquid can spoil a pump. It lists common mistakes in packing stuffing boxes, gives tables on how to figure head, as well as other useful information on the care of pumps. Illustrated with cartoons. Allis-Chalmers Mfg. Co.

–12–

CLEANING EQUIPMENT—for washing, rinsing, and drying metal parts is described in booklet that also shows blueprints and photographs of the equipment. Colt's Patent Fire Arms Mfg. Co.

–13–

COATING—to prevent and cure condensation that forms on metal pipes and fixtures, basement walls, and ceilings, is described in 32-page handbook. Instructions for applying "NoDrip," coverage, drying time, list of uses, and other data are included. J. W. Mortell Co.

–14–

COLLOIDAL GRAPHITE—One of a series written to show what colloidal graphite is and how it is used, Bulletin 430-44 describes the physical and chemical properties of "dag" colloidal graphite and how it differs from other forms of graphite. Summarizes standard colloidal and semi-colloidal dispersions. Illustrates a number of typical applications. Bulletins 421 and 422 supplement the general bulletin. Acheson Colloids Corp.

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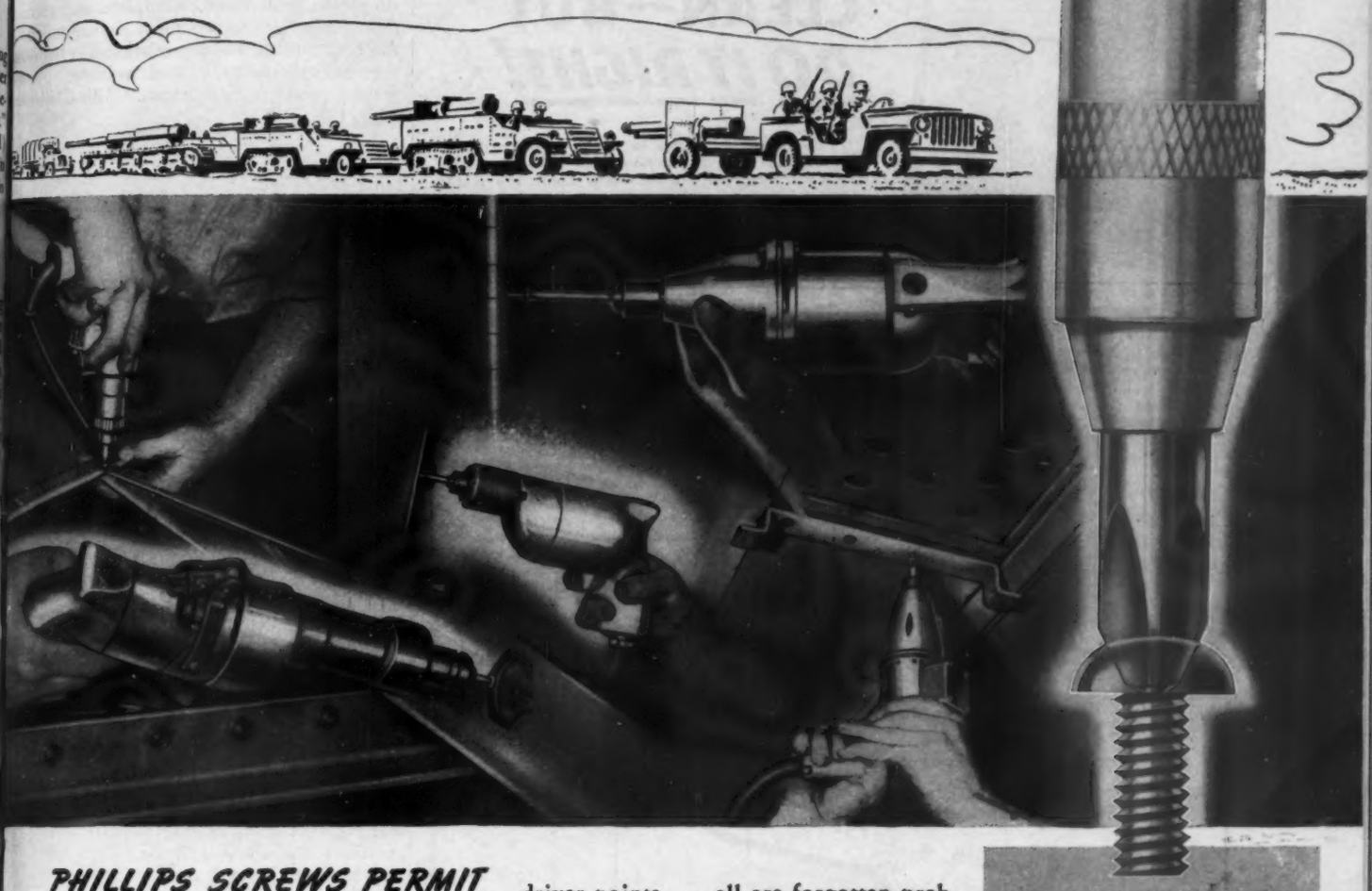
COMPRESSOR—Small compressor with many uses is subject of 4-page folder. Pictures of applications, as well as of the equip-

MECHANIZE
Your Screw Driving Army



PHILLIPS SCREWS PERMIT FAST DRIVING METHODS!

Like our fast-moving fighting forces, your screw driving army can now be mechanized to set new speed records on the assembly line.

You can have the advantages of power or spiral driving on almost any job . . . by adopting Phillips Recessed Head Screws. Automatic centering of driving force in the Phillips Recess eliminates the driving troubles that often make fast driving methods impractical. Fumbling, wobbly starts . . . slant-driven screws . . . broken-head screws . . . dangerous skidding of driver points . . . all are forgotten problems in plants that use screws with the Phillips Recessed Head.

Even "green hands" can do fast, skilled work. Savings of 50% in driving time are common. Such man-hour savings are important to the war effort, since so many workers in the average plant are driving screws.

They cost less to use! Compare the cost of *driving* Phillips and slotted head screws. You'll find that the price of screws is a minor item in your total fastening expense . . . that it actually costs *less* to have the many advantages of the Phillips Recess in your assembly work.

KEY TO FASTENING SPEED AND ECONOMY

The Phillips Recessed Head was scientifically engineered to afford:

Fast Starting – Driver point automatically centers in the recess . . . fits snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.

Faster Driving – Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)

Easier Driving – Turning power is fully utilized by automatic centering of driver in screw head. Workers maintain speed without tiring.

Better Fastenings – Screws are set-up uniformly tight, without burring or breaking heads. A stronger, neater job results.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS SELF-TAPPING SCREWS • STOVE BOLTS

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Central Screw Co., Chicago, Ill.
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Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
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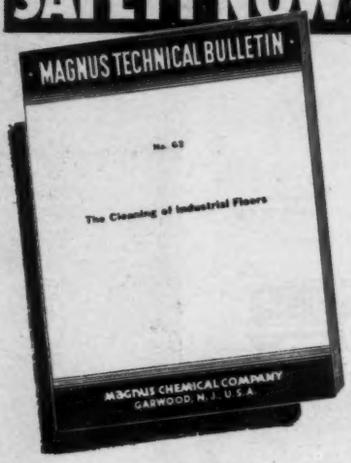
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N. H.

SAFETY NOW and DOLLARS THEN!



KEEP FLOORS CLEAN--BUT *DO IT RIGHT!*

Every accident due to slippery, dirty floors robs the war production effort—whether lost time is slight or large. Clean floors are more vital today than ever before, in these days of rushed production, "green" employees and nervous tension. But the wrong cleaning material and the wrong method not only fail to clean floors properly—they also affect the life of your floors.

Here is a technical bulletin on safe floor cleaning methods for every type of floor. Write for your copy NOW.

MAGNUS FLOOR CLEANERS

are especially designed for particular types of floors. The methods recommended for their use are based on cleaning for safety now and saving dollars then by prolonging instead of shortening floor life.

It will pay you to study the bulletin illustrated here. It will save men and dollars.

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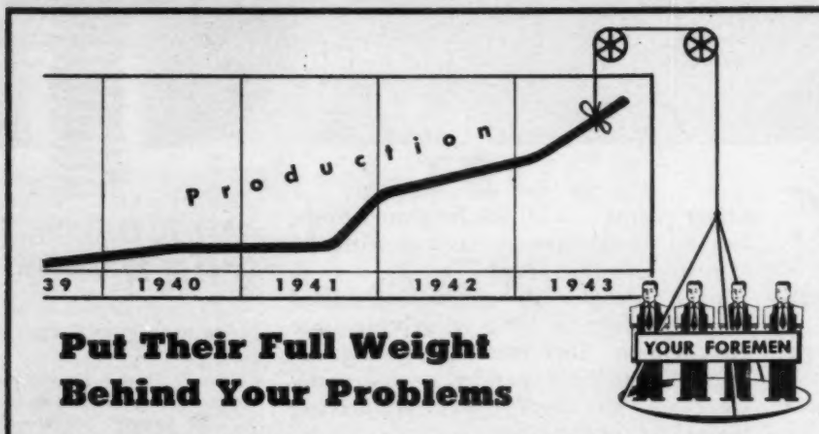
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.

Service Men in All Principal Cities

220 South Avenue Garwood, N. J.

MAGNUS CLEANERS



Put Their Full Weight Behind Your Problems

If you could make full use of the "Brain Power" of your Foremen you'd be surprised. If you could, many managerial headaches would pass away like magic.

Most Foremen have plenty of "Brain Power" (intelligence) but some don't know how to use it. Here is a Foreman Development Program that will increase their ability in these ten definite ways: (1) Handling people. (2) Cost Control. (3) Waste Reduction. (4) Quality Standards. (5) Accident Prevention. (6) Organization. (7) Training Workers. (8) Job Relations. (9) Methods Improvement. (10) Self-improvement.

MANAGEMENT INFORMATION is a four-page bulletin, written from week to week by Glenn Gardiner and a staff of practical executives. It is easy to read, easy to digest, and geared to producing all-out war effort from your Foremen and Supervisors.

Write for our folder that explains, conclusively, why your Foremen need this additional training and why MANAGEMENT INFORMATION is best equipped to give it to them.

ELLIOTT SERVICE COMPANY

219 East 44th Street, New York, N. Y.

INDUSTRIAL BULLETIN BOARD SERVICE Improves morale. Keeps workers keyed up to war tempo.

Other Elliott Services

EMPLOYEE SUGGESTION SERVICE For tapping the idea resources of your employees.

ment, are shown. Specifications and recommended uses are listed. Schramm, Inc.

–16–

COMPRESSORS AND PUMPS—Bulletin B-6211 makes Ro-Flo compressors and pumps of the sliding vane type and their operation simple to understand. Complete engineering description is supplemented by installation diagrams; curves showing relationship between pressure, temperature, and volume; photographs; and section views. Allis-Chalmers Mfg. Co.

–17–

CONDENSERS—General information regarding wartime industrial uses of evaporative condensers and coolers is contained in 8-page booklet. General Electric Co.

–18–

CONNECTORS—In addition to general information on type AN connectors, 82-page bulletin also contains pages on junction shells, cable clamps, dust caps, dummy or stowage receptacles, and bonding rings. A condensed supplement is included as a separate section. Cannon Electric Development Co.

–19–

CONTROL BOARD—for use in scheduling, machine loading, purchasing, production assembly, individual and group incentive tools—is described and pictured in 12-page folder. Also separate sheets showing special applications. Wassell Organization.

–20–

CONTROL VALVES—"Quick-As-Wink" control valves of all kinds are described in catalog that includes photographs and specifications for air and hydraulically operated valves. C. B. Hunt & Son.

–21–

"CONVEYORS—That Are Helping Bring Victory Faster" pictures and describes wartime conveyors for indoor transportation of manufactured products from bombs to batteries, jeeps to jigs. Alvey-Ferguson Co.

–22–

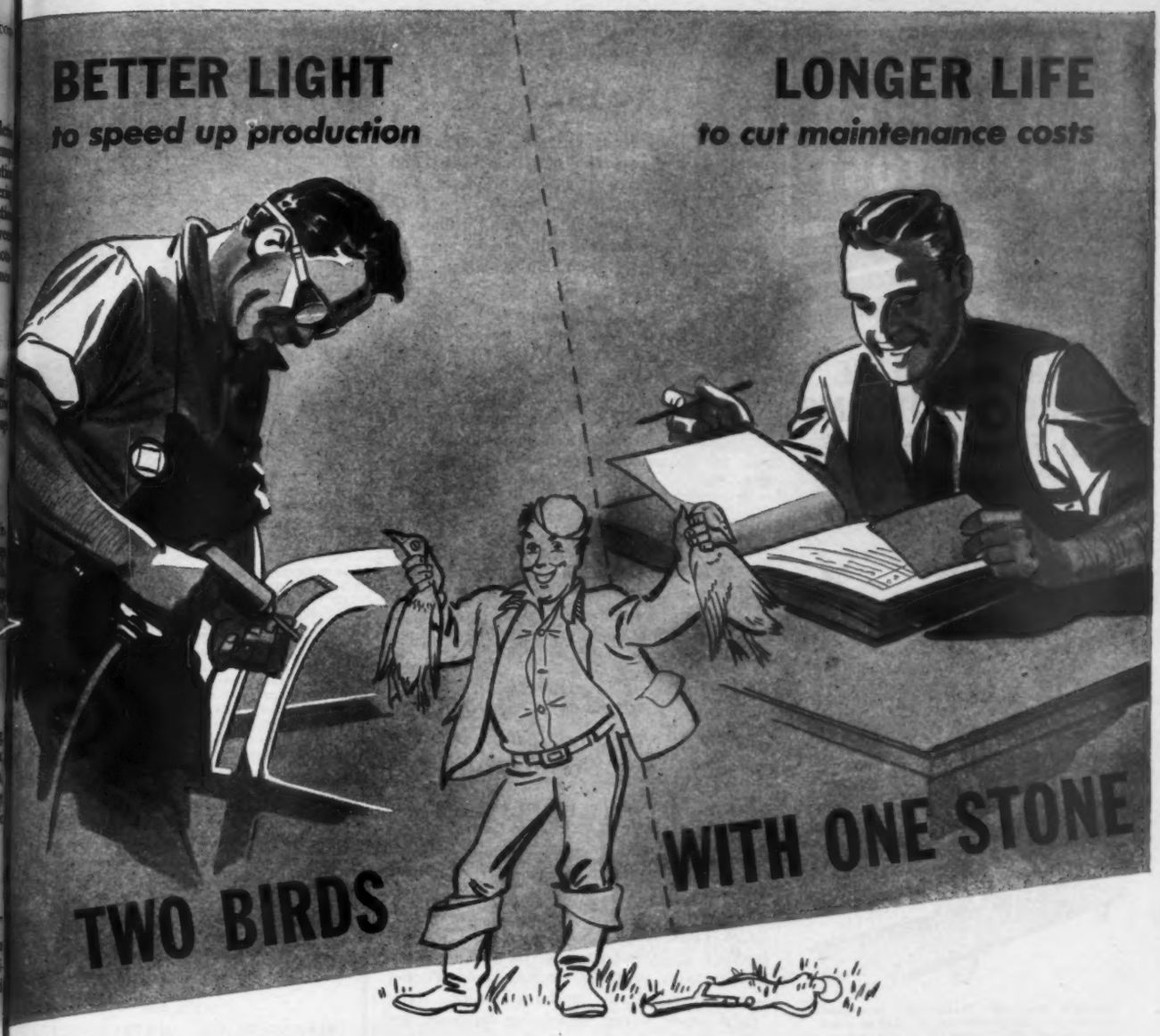
CONVEYORS—and stackers for boxes, bags and crates are shown in 12-page Bulletin 76. Schematic drawings, specifications, pictures of equipment, and installation photographs are included. The Jeffrey Mfg. Co.

–23–

CRANE—dragline, and shovel Catalog 196 covers 2- to 3-yd. Speed-o-Matic Series 500. Eight pages are devoted to dimensions, clearance diagrams, working ranges, lifting capacities, and specifications. Link-Belt Speeder Corp.

–24–

CRANES—Safety first in operating cranes is stressed in colored poster, colored leaflet, and booklet "Rules for the Safe Operation of



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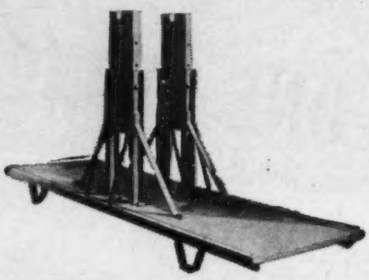
HANDLING SIMPLIFIED AT LOW COST

A COMPLETE LINE OF SKIDS, PLATFORMS AND FLOOR TRUCKS

A completely assembled "Ironbound" skid with flush angles and countersunk bolts. Designed for greatest operator safety and long hard usage. Will handle loads up to 20,000 pounds.



Specially designed "Ironbound" superstructure for carrying shafted objects such as armatures, motors, etc. Notice the flexible bearing arms which can be lowered or raised in the heavy steel channels.

★ "Ironbound" materials handling equipment is built to give great service-life under "rush" conditions. Ample protection to both operator and materials being handled is assured thru the various improved construction features. Available immediately are the standard types, and specially built units can be had on short notice. Illustrated literature is available on request; write today.

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IRONBOUND SKIDS
AND MATERIALS-HANDLING EQUIPMENT

Overhead Traveling Cranes." All safety rules are listed in 1-2-3-order. Whiting Corp.

–25–

CRANES—and hoists. Instructions on how to maintain and operate electric cranes and hoists are given in 104-page brochure. Details of construction are shown. Emphasis is placed on taking care of small things so that larger and more costly repairs may be avoided. Shepard Niles Crane & Hoist Corp.

–26–

ELECTRIC DRILLING RIGS—to meet any drilling problem are described and illustrated with photos, charts, and diagrams in a 57-page booklet, B-3038. Equipment listed for a.c. and d.c. drilling, and maintenance and care are discussed. Westinghouse Electric & Mfg. Co.

–27–

"ELECTRIC HEAT—in Industry" explains how various applications of electric heat dispel problems caused by ice and snow, speed up rust-proofing, boost temperature, etc. General Electric Co.

–28–

ELECTRIC TOOLS—Complete line of "Hi-cycle" portable electric tools is shown in 68-page catalog. Pictures of actual equipment appear against background of their places of application. Specifications of each tool are included. Chicago Pneumatic Tool Co.

–29–

ELECTRIC TOOLS—Maintenance manual, Booklet JE-199, tells how to get maximum service from portable electric tools. Pocket-size, 20 pages, it contains clearly stated "right" and "wrong" operating methods, and tells what to do when a tool fails to operate. Independent Pneumatic Tool Co.

–30–

ELECTRICAL CONNECTORS—for aircraft wiring. Comprehensive catalog divided into five parts—each indexed for easy reference. Presents engineering data and approved mechanical methods for terminating aircraft wires and cables and for bonding in accordance with Army and Navy specifications. The Thomas & Betts Co.

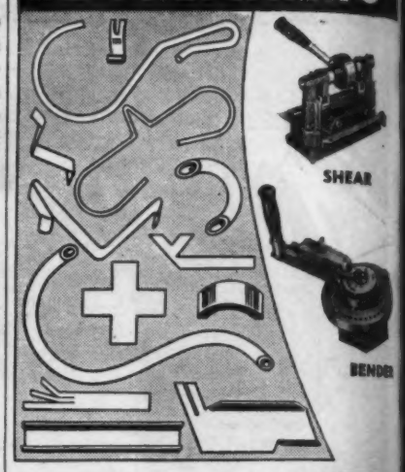
–31–

ELECTRONIC CONTACTORS—for fast power switching of a.c. resistance welding machines are described in 8-page Bulletin GEA-3058B. Bulletin outlines features, illustrates construction, and points out ease with which controllers can be installed and the simplicity of their operation. General Electric Co.

–32–

FLUORESCENT LIGHTING—This catalog, designed to simplify problems of selecting proper types and quantities of fixtures for a

DIE-LESS DUPLICATING



These parts shown are typical of the great variety of simple or intricate forms and shapes which can be quickly duplicated to a tolerance of .001" with DI-ACRO Precision Machines — Shears, Brakes, Benders. For experimental and research work or production runs, DI-ACRO Units form angle, channel, tube, rod, moulding, wire strip stock; shear stock sheets, trim duplicated stampings. With DIE-LESS DUPLICATING, Man Hours and Critical Materials are saved.

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Walls and Cement Surfaces
ELIMINATED! !
with our
HARDENER & WATERPROOFER

Easily applied! A broom and a bucket are all you need. These crystals dissolve quickly in water . . . dries immediately . . . transparent. May be painted over at any time if desired. Ideal for ALL porous interior and exterior masonry. Also eradicates mouldy cellar odors, acts as a germicide: eliminates fungicide. Guaranteed!

Packed in 5, 10, 25, 100 & 250 lbs. FREE Delivery 25 lbs. up. Smaller quan. add 25c

To estimate your requirements. 2½ lbs. makes 2 gals on each 100 sq. ft. surface . . . enough for 2 applications.

(Net cost less than 44c per gal.)

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Used in factories, institutions and homes.

350 lbs (barrel) 32c per lb.
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Koppers "C & C"* Projects

*Current and Contemplated

Better roofs may be born in an igloo

Tar and Chemical Division

1 Current

Koppers Coal Tar Products "keep your powder dry"— In concrete "igloos" covered with ground, the Army keeps its powder dry and safe from enemy eyes. This is fine for the powder but hard on concrete. To protect the concrete and exclude water, many of these igloos are sealed in watertight "blankets" of Koppers coal tar pitch and tar-saturated fabric and felt.

2 Contemplated

More roofing products may soon be available for non-war use— Many of the biggest wartime building projects are well along toward completion. More coal tar pitch roofing may soon be available. This will be good news for anyone who has roofing work to be done, because coal tar pitch and tar-saturated felt are such long-lasting materials.

Bartlett Hayward Division

3 Current

Koppers Fast's Couplings drive the "Alligator Boats"— When American amphibian tanks plow through the water toward an enemy shore and then crawl up out of the water and lumber on across the ground, Koppers Fast's Couplings transmit the dependable power that drives them on land and sea.

4 Contemplated

Fast's Couplings will drive more and more of industry's wheels—On blowers, motor generator sets, on speed reducers, on conveyors and in dozens of places Self-aligning Fast's Couplings provide the best guarantee against shut-downs. The load-bearing surfaces are protected against wear by a positive film of oil.

Koppers Company and Affiliates, Pittsburgh, Pa.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

particular project, illustrates over 30 models, contains technical specifications, lists recommended minimum standards of illumination, includes information on how to plan a fluorescent installation, pictures actual installations, lists general engineering and maintenance data. Sylvania Electric Products, Inc.

–33–

FORK TRUCKS—Models JOM, single lift, and JOMH, telescoping lift, center-control fork trucks are shown in Bulletin 1311b. Parts are pictured, and trucks are shown in operation. Specifications and schematic drawings are included. Baker Industrial Truck Div. of The Baker-Raulang Co.

–34–

GAS WELDING—and flame cutting tips. How to clean as many as 500 tips in three hours and the material used are described in a special service report. Oakite Products, Inc.

–35–

GEARS—Combination catalog and gear data book No. 42 includes tables of dimensions for various types of gears and data on speed reducing units, MotoReducers, and electric hoists. Engineering data section also. Philadelphia Gear Works.

–36–

GLASS—"Can Glass Help You Fill War Contracts Quicker and Better?" is title of well-illustrated booklet that shows the properties of glass, and suggests how it can be used to save critical materials. Libbey Glass Co.

–37–

HARD-FACING MATERIAL—Bulletin 153 describes the advantages and physical characteristics of "No-Wear" for hard-facing. Methods of application and typical uses are detailed also. Callite Tungsten Corp.

–38–

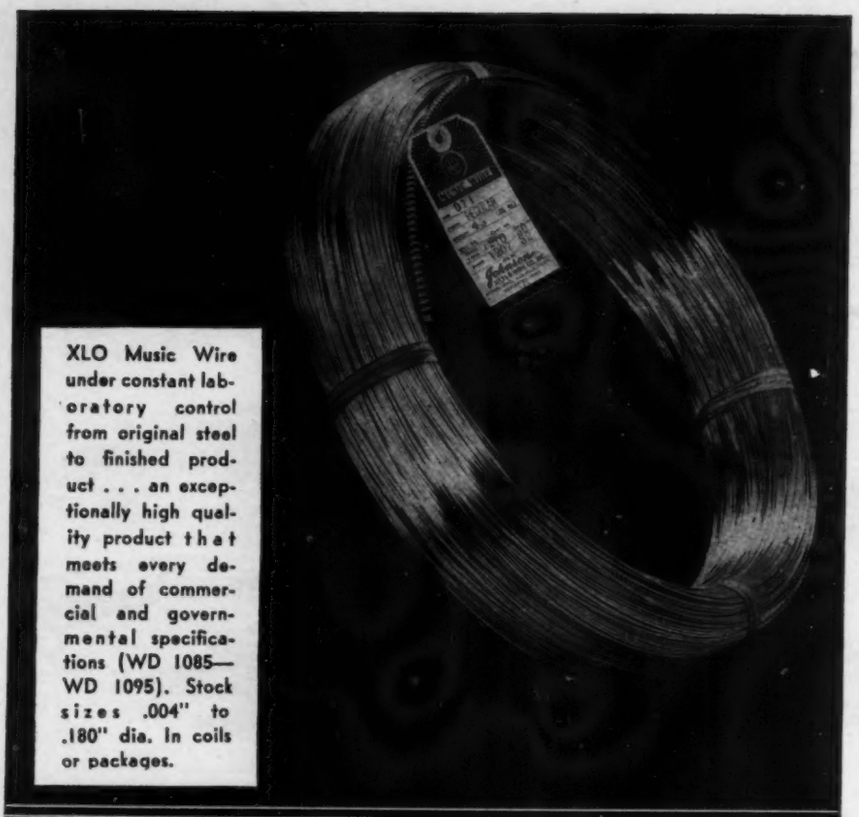
HATS—for women in industry. Four-page folder shows hats designed by Lilly Daché for safety and good looks. All models cover the hair completely, and are light, cool, and washable. They are made of plastic and fit all head sizes. Mine Safety Appliances Co.

–39–

HEAT-TREATING—"Homo Method for Nitriding," Catalog T-624, explains and pictures method that is said to give heat-treaters precise control of the three variables—nitriding temperature, flow and distribution of ammonia gas, and duration of treatment. Leeds & Northrup Co.

–40–

HOIST—and crane maintenance folder covers the various phases of maintenance necessary for trouble-free performance, and is designed to serve as a permanent file for parts lists, diagrams, instruction sheets. Regular file-sized



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No extra man needed to steady—Roomy platform for men and tools—Great strength, lightweight. Guard rails on platform—Automatic locking—Folds compactly. Airplane spruce used throughout—Steel braces—Safety shoes. Available in sizes 3' to 16' in height—Elevating platform adds height to the Dayton Safety Ladder. *Write today for Free Catalog—Prices.*

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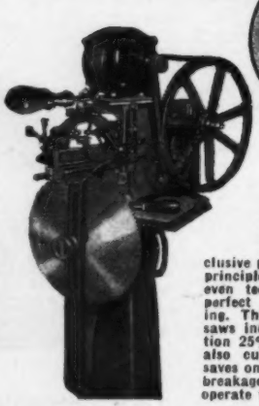
Increase Sawing Production



25% TO 40%!

Your saws will cut faster and truer and stay sharp longer when filed on a Foley Saw Filer. The exclusive patented Foley jointing principle straightens up uneven teeth and makes them perfect in size, shape, spacing. That is why Foley-filed saws increase sawing production 25% to 40%. The Foley also cuts down filing time, saves on files and reduces saw breakage. Any man or boy can operate the

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The Foley Filer is the only machine that sharpens cross-cut circular saws 3" to 24" in diameter, band saws ½" to 4½" wide—all hand saws.

FILING SAWS FOR VICTORY
The Foley Filer is in use by U. S. Army, Navy, Air Force and many other Gov't Depts.—also by hundreds of war and industrial plants.

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Find out on your own work how much the Foley Filer can save you. Write today for folder and full details of our 30-day trial offer.

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AVE MATERIALS AND MACHINES

On d-c motor drives...

FAULT CURRENTS CAN BE KEPT LOW

This ultra-high-speed circuit breaker is so fast that fault currents can't rise to dangerous values.

ON PRESENT DAY d-c systems with generators, converters or rectifiers connected in parallel, fault currents rise so rapidly that serious damage may be done before a conventional circuit breaker can limit the current. Ordinarily the circuit breaker will open in 3 cycles, in special cases in 1½ cycles, but with fault currents rising at a rate of several million amperes per second, such opening times permit flash-overs to burn brushes and brush-holders. Damage is done; production is stopped for repairs or replacements.

ULTRA-FAST OPENING IS THE ANSWER

The way to protect a system against the effects of rapidly rising currents is to hold the peaks to safe values. I-T-E does this with fast-opening circuit breakers. The Type FB circuit breaker, illustrated, has opening characteristics which limit currents within 2/5ths of a cycle (60 cycle basis).

IMPORTANT SAVING OF MATERIALS

When high fault currents are to be encountered, bus structures must be built with heavy conductors and heavy bracing. On the other hand, when peak currents are kept low by ultra-fast circuit breakers, much metal is saved; buses are much simpler.

HIGH-SPEED CIRCUIT BREAKERS HAVE PROVED THEIR VALUE

I-T-E has high-speed circuit breakers in service. They are new but their record is well-founded. Our engineers will gladly tell you about them.

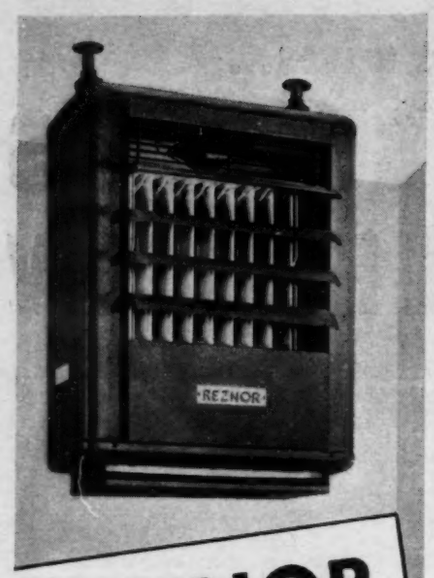
I-T-E

AIR SWITCHGEAR

IMMERSED IN AIR • ENCASED IN STEEL

Representatives in Principal Cities

CIRCUIT BREAKER CO., PHILADELPHIA, PA.



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UNIT HEATERS HELP KEEP JIM OFF THE ABSENTEE LIST...

During Winter and Summer

GREATER EMPLOYMENT plus crowded plant conditions call for wider distribution of heat as well as better air circulation. Easily installed gas fired Reznor Unit Heaters meet these emergency demands. Due to the special design of Reznor Heat Exchanger Tubes, more warm air is moved from Reznor Heaters in winter and greater air circulation is provided during hot summer days. Men on the war production line work in comfort—hence, less fatigue, more efficiency, fewer days off for illness, and greater production result. This easy-to-install equipment SAVES 89% in vital materials.
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GAS HEATERS EXCLUSIVELY SINCE 1888

pull-out type folder made of stiff paper, Robbins & Myers, Inc.

–41–

HOSE COUPLERS—Four-page bulletin gives specifications and illustrations of swivel ball-bearing hose couplers, both plain and automatic shutoff types, for high- and low-pressure air, water, oil, and grease applications. Snap-Tite Coupler Co.

–42–

HYDRAULIC EQUIPMENT—To simplify the wartime buyer's job, 12-page Catalog V-43 contains only wartime products. Reference on hydraulic hand jacks, wheeled service jacks, gage-equipped jacks, Porto-Power hydraulic units, maintenance kits, motor vehicle assortment, and pipe benders. Blackhawk Mfg. Co.

–43–

LATHES—Bulletin H-3 "The Installation and Leveling of the Lathe" and Bulletin H-4 "Keep Your Lathe in Trim" are two booklets in a series being offered to lathe users and operators to help them get more production out of lathes. Bulletin 1002 describes turret lathes Nos. 1001-Z and 1002-Z. Catalog 10 shows 10-in. precision lathes, attachments, and accessories. South Bend Lathe Works.

–44–

LIFT TRUCK—Small-sized telescopic lift tilting fork truck of 2000-lb. capacity is described and pictured in 4-page folder. Specifications are included, as well as schematic drawings. Yale & Towne Mfg. Co.

–45–

LIGHTING—"See-Ability for Indoor Eyes," A-4163, shows how proper light applied to seeing tasks, provides the "see-ability" that increases production, reduces accidents, and helps to prevent spoilage. Tells how to get the most out of present lighting systems. Westinghouse Elec. & Mfg. Co.

–46–

LUBRICATION HINTS—for war plants. Single sheet in four colors that lists points to watch for lubrication needs, and how to apply lubricants. Third of a series. E. F. Houghton & Co.

–47–

METAL BLACKENING—by the "Ebonal" process is described in four folders. One, eight pages, is devoted to the various metals that can be so treated. The other three give operating instructions for treating copper, zinc, aluminum, and their alloys, respectively. The Ethone Co.

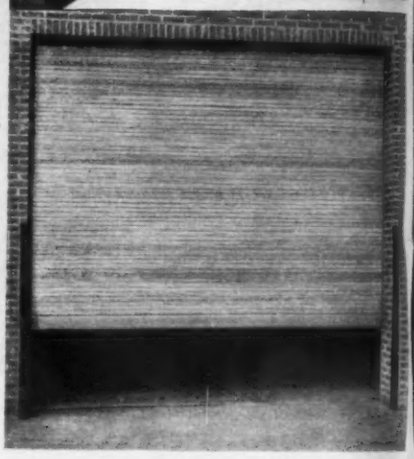
–48–

MOTOR CONTROLS—How to select and apply motor control is explained in easy-to-read, 16-page manual, "Simplified Guide to

TWO VITAL DOOR ADVANTAGES FOR WARTIME NEEDS

COILING UPWARD ACTION

MOTOR OPERATION



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Kinnear *Motor Operated* Wood Rolling Doors can be opened or closed quickly at the touch of a button — from any convenient location! The rugged, heavy-duty motor does the work, saves valuable time and labor.

And coiling, upward action saves valuable floor, wall and ceiling space. The doors stay out of the way when open, safe from wind or traffic damage.

Strong inter-lapping wood slats form a rugged curtain that blocks out wind and weather, yet presents a neat appearance.

Kinnear Wood Rolling Doors also assure highest economy of war-vital metals!

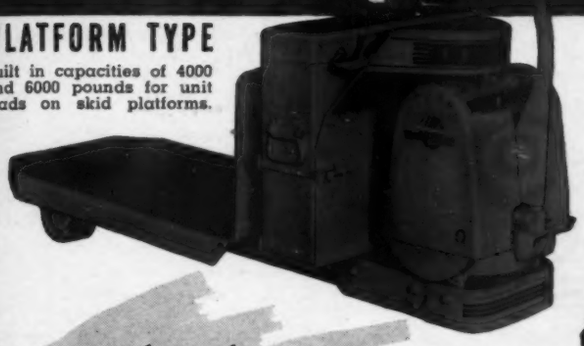
They are built in any size, for use in old or new buildings. Manual control only, if desired. Write for details today! The Kinnear Mfg. Company, 1540-60 Fields Ave., Columbus, Ohio.

Saving Ways in Doorways
KINNEAR
ROLLING DOORS

THIS MECHANIZED HANDLING SAVES WASTE IN MANPOWER AND TIME . . . .

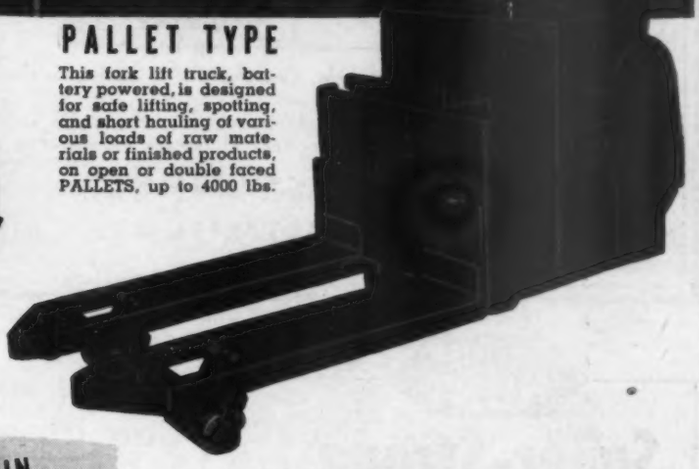
PLATFORM TYPE

Built in capacities of 4000 and 6000 pounds for unit loads on skid platforms.



PALLET TYPE

This fork lift truck, battery powered, is designed for safe lifting, spotting, and short hauling of various loads of raw materials or finished products, on open or double faced PALLETS, up to 4000 lbs.



POSITIVE MECHANICAL BRAKE

FRONT WHEEL POWER DRIVE

CONTROLS IN STEERING HANDLE

Automatic TRANSPORTER

FORWARD AND REVERSE SPEEDS

SHOCKLESS HYDRAULIC PLATFORM LIFT WITH EASY FOOT CONTROL

★ The TRANSPORTER performs a vital service in keeping materials moving on those short hauls from one process to another. This mechanized handling of small loads will simplify your entire materials haulage system whether in cramped quarters or narrow aisles . . . it speeds things up and entirely eliminates straining, tugging, pulling, or extra pushing on part of trucker.

● Full power can be attained in steering at any angle through a 210-degree range, making it easy to break out loads from storage with little maneuvering. Sufficient power is available so that no extra manual push or pull is necessary to help the truck over toe plate humps or elevator ridges.

AUTOMATIC TRANSPORTATION COMPANY

DIV. OF THE YALE & TOWNE MFG. CO.

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MANUFACTURERS FOR OVER 35 YEARS *Electric Propelled* INDUSTRIAL LIFT TRUCKS

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Gentlemen: Please furnish complete information on the "TRANSPORTER" without obligation.

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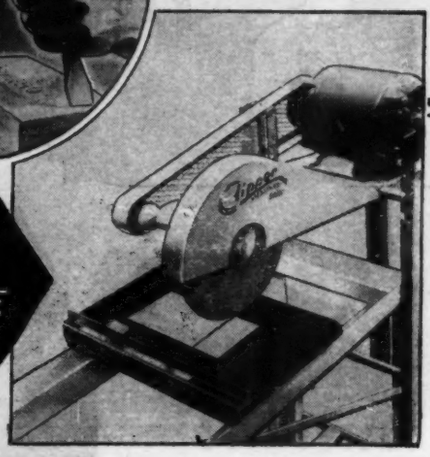
COMPANY_____

ADDRESS_____

CITY_____ STATE_____

These Days ARE GONE FOREVER

But... THESE ARE HERE TO STAY



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Firebrick, Glazed Tile, Brick and Concrete can be cut quickly and accurately, eliminating "Hammer and Chisel" methods of furnace and building construction and repairs.

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Super-Strong ROLLS

PATENTED "SHAF-TITE" CONSTRUCTION

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Wire or write for your copy of illustrated catalog No. 417

ACME VISIBLE RECORDS, INC.

122 So. Michigan Avenue

Chicago, Illinois

the Selection and Application of Commonly Used Motor Controls." General Electric Co.

–49–

MOTORS—"American Electrical Standards for Fractional Horsepower Motors" digests standards approved by interested societies and government departments. Definitions of all terms and motor parts, speeds and duty classifications, motor types and standards are included. Pocket-sized handbook of 28 pages. The Dumore Co.

–50–

MOTORS—and generators are described in 8-page bulletin. Cut-away photographs, construction details, lists of types available are included. Burke Electric Co.

–51–

MOUNTINGS – Bulletin 103, "Vertical Snubbing," gives principles and information about shear-type mountings. Bulletin 104 is devoted to vibration control. Both show schematic drawings, photographs, and charts in color. Lord Mfg. Co.

–52–

"PAINT—that Preserves America" is small-sized 48-page booklet that shows in a series of pictures how and where paint is developed, manufactured, and stored. Devoe & Raynolds Co., and subsidiaries.

–53–

PAINTS—varnishes, and finishes are treated in 12-page booklet that shows architectural specifications for these materials. Color charts and suggested applications are included. The Sherwin-Williams Co.

–54–

PANELBOARDS—and cabinets. Bulletin 69 contains information for those interested in actually planning and engineering an electric light, heat, and power distributing installation. Frank Adam Electric Co.

–55–

PIPING—History of the development of piping from the earliest days to the present. Illustrated with authentic drawings and photographs. Twelve pages of interesting information that has required much research to set forth. Tube Turns.

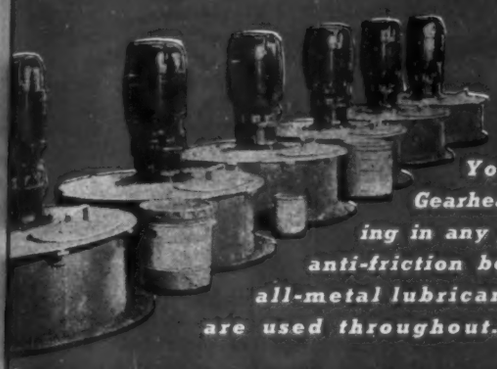
–56–

PNEUMATIC CONTROLLER – trademarked Micromax is discussed in Catalog N-00B. Controller is said to employ a system of electrical and mechanical balances which detects any departures from the control point and simultaneously changes the air pressure to correct them. Standard ranges, dimensions, shipping weights are included. Leeds & Northrup.

–57–

POWER TRANSMISSION—and materials handling equipment are included in 180-page

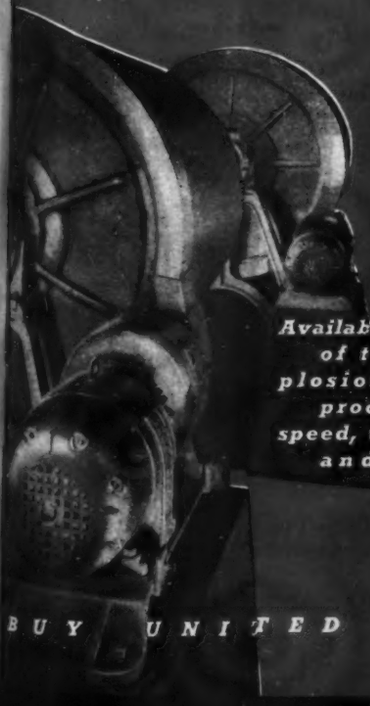
1/10 TO 100 HORSEPOWER
Five types of gearhead motors have reduction ratios ranging up to 432 to 1.



You can secure Master Gearhead Motors for mounting in any position because anti-friction bearings and all-metal lubricant seals are used throughout.

MASTER GEARHEAD MOTORS

THE MASTER ELECTRIC COMPANY • DAYTON, OHIO



Available in a wide range of types including explosion proof, splash proof, fan cooled, multi-speed, uni-brake motors and Speedrangers.

Save material and save space with simple, compact, integrally built Master gearhead motors.

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FINISHED TO YOUR SPECIFICATIONS FABRICATED INTO COMPLETED PRODUCTS

Strainers, baskets, filters, screens — hundreds of varieties — are moving through the "Buffalo Wire" plant. Close tolerances, accurate sizes, difficult shapes—such are the specifications demanded for tanks, ships and planes.

To a large group of America's war industries—synthetic rubber, chemical, process, oil refining, powder, abrasives—"Buffalo Wire" is delivering wire and metal products **ready for productive use.** No doubt your plant, too, can make profitable use of these broad services:

TRIMMING, SLITTING, CUTTING to accurate dimensions

BINDING with webbing, sheet metal edging

DIE-CUTTING shapes and circles

SOLDERING several types of cloth into one panel

SHAPING forms of various depths

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Buffalo WIRE WORKS CO., INC.
ESTABLISHED 1869 AS SCHEELER'S SONS

440 TERRACE BUFFALO, N. Y.

Useful Facts to help you select Traveling Cranes...

This new 16-page booklet can give you useful information about crane trolleys, end trucks, driving units, gear cases, cabs and lower blocks. "The WHY and HOW of Faster Production At Less Cost" shows *Reading Traveling Cranes* at work in plants like yours. It shows how they are helping to speed output and reduce maintenance troubles.

Ask for your copy of this booklet. *A note on your company letterhead* will start your copy on its way, at no obligation, of course.

Reading Chain & Block Corporation, 2103 Adams St., Reading, Pa.

READING CHAIN HOISTS·ELECTRIC HOISTS OVERHEAD TRAVELING CRANES

General Catalog 850. Dimensions, weights, list prices, and other data are given on chains, sprockets, chain drives, bearings, pulleys, couplings, car spotters, speed reducers, and many other parts. Link-Belt Co.

—58—

PRESERVERS—Three leaflets, each devoted to a special type of preserver. Ensign 384 Rope Preserver is claimed to waterproof wire rope, prevent waterlogging of fiber rope; Ensign 371 Belt Preserver cleans, preserves, and protects all kinds of belts; and Ensign 395 Metal Preserver prevents rust and corrosion. Ensign Products Co. (Two of these leaflets were incorrectly described in the February issue under item No. 22.)

—59—

"PRODUCTION—for Victory" is title of impressively illustrated booklet giving interior and exterior views of plant built to make hydraulic equipment, now devoted to turning out aviation and ordnance equipment, special presses, pumps and fluid motors, valves, and the like. The Dennison Engineering Co.

—60—

PROTECTIVE CLOTHING—for men and women. Bulletin 143 includes "protector" helmets, welders' helmets, rain and storm capes, safety hats, and breast protectors. Strauss Co.

—61—

PUNCH PRESS DEVICES—Safety press operating devices, automatic air blast valves and ejectors, and unit air compressors are the subject of a well-illustrated folder, AD 4946. Recommended applications, prices, and ordering information included. Benjamin Electric Mfg. Co.

—62—

RECORDERS—A "time clock for machinery" is described in 2-page leaflet and 6-page folder. Diagrams show what movements will operate the recorder. Instructions for installations are included. The Service Recorder Co.

—63—

SAFETY EQUIPMENT—Illustrations and descriptions of various types of protective lenses, goggles, welders' helmets and shields, respirators, masks, grinder guards, and toe guards. Profusely illustrated. Chicago Eye Shield Co.

—64—

SPARKPLUG BUSHINGS — Specification folder deals with Heli-Coil sparkplug bushings. Description and advantages of the bushings and tools for installing and servicing are discussed. Diagrams show standard specifications and design. Aircraft Screw Products Co., Inc.

—65—

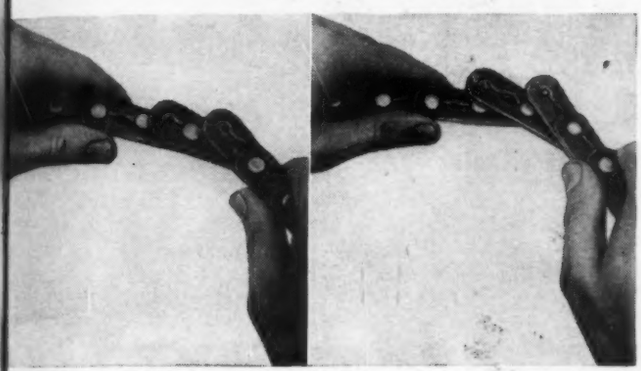
STAPLERS—Two 4-page bulletins. One shows hand-operated, heavy-duty staplers for

PROVED IN

PRODUCTION

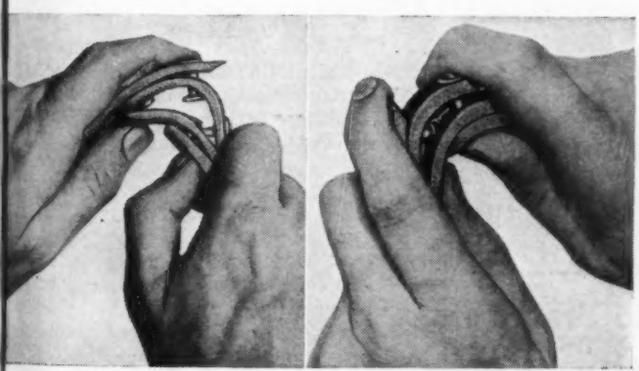
VEELOS . . . . the Practical Link V-Belt

HOW TO COUPLE VEELOS



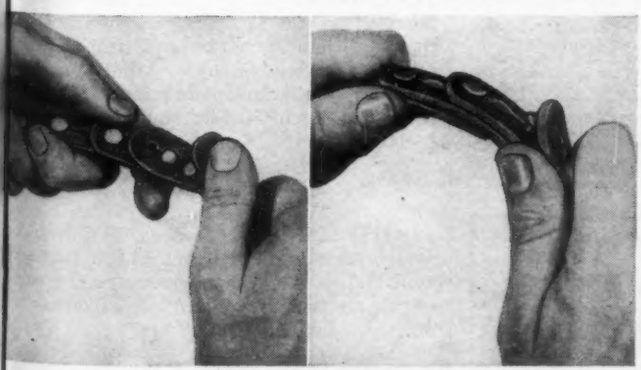
1. *Bring end rivet up through enlarged hole in segment.*

2. *Pass rivet down slot to proper position.*



3. *Bend belt backward holding segment ends together under thumb.*

4. *Bend belt further backward forcing enlarged opening down over rivet head until head is through.*



5. *Straighten belt bringing rivet head up through enlarged hole.*

6. *Bend belt forward to pass rivet down the slot to proper position. Repeat for the other rivets.*

VEELOS—the practical link V-Belt—has been proved on war production drives that really put a belt "through the mill." Veelos is easy to install...easy to adjust...runs smooth ...runs steady. A Veelos engineer ...especially trained in power transmission problems . . . can show you how and why in less than 15 minutes!

FREE! NEW, COMPLETE VEELOS PRODUCTION MANUAL!

Free manual—just off the press—gives complete instructions on use...length table... engineering data ... analysis of Veelos link construction. Tells how to measure ... couple...uncouple... any size of Veelos. Write today for your copy of this valuable reference.

Made In All Standard Sizes (⅜", A, B, C, D, E) . . . Fits All Standard V-belt Grooves.

VEELOS

THE LINK

V-BELT

ADJUSTABLE TO ANY LENGTH
ADAPTABLE TO ANY DRIVE

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MANHEIM, PENNSYLVANIA

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"KEEP 'EM ROLLING"

Don't let slow-moving, hard to handle, ramshackle floor trucks cause a slow down in your production line during these critical days. Be sure you have fast, easy moving Hamilton Trucks. They're always a sound investment and doubly necessary in the present emergency when every man-hour gained means a contribution toward victory.

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PRICED RIGHT!

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1762 Dixie Highway
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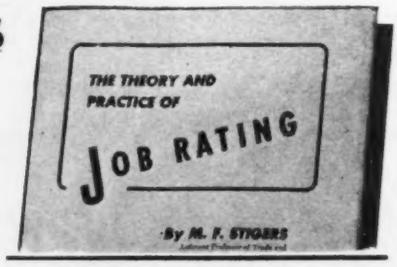
Write for our latest catalog

How to rate jobs

- for greater incentive
- for increased production
- for balanced purchasing power
- for better employee relations

Here is a book to help you rate every job in your plant accurately, set wages scientifically on such a job-rating plan, measure even the so-called intangibles on any job. It is the first published in this country to give a basic understanding of the fundamentals or theory of the actual practice of job rating and to present an accurate and scientific technique for the actual work of job rating.



The Theory and Practice of Job Rating

By M. F. Stigers, Purdue University, and E. G. Reed, Reed Laboratories, Inc.

154 pages, $1.75

Some questions answered in this stimulating book

—should not wages be set on supply and demand instead of being based on the results of a theoretical calculation?

—what should be done to a rate when there is a temporary shortage of skilled labor to fill a special job?

—why not pay the "going rate" of the community?

—what effect should profit and loss have on wages?

—can the value of all types of labor and of technical and managerial positions be calculated?

Noteworthy for its original and unusually factual approach to job rating, this book offers an accurate, practical means of measuring every job element—including the intangibles heretofore considered unmeasurable. The fundamentals and philosophy underlying the subject are discussed; a scientific technique for the actual evaluation work is given; and questionnaires, rating scales, a cross comparison procedure, and pertinent data, plus full instructions, are provided. Employers and employees alike can understand this approach, and appreciate its substitution of facts for the opinions of rators. See how you can use it; send for a copy of the book to examine and read, today.

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McGraw-Hill Book Co., 330 W. 42nd St., N. Y. C.

Send me Stigers and Reed—Theory and Practice of Job Rating for 10 days examination on approval. In 10 days I will send $1.75, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

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Address .....

City & State .....

Position .....

Company .....Fac. 5-43

various applications; the other, self-feeding tack hammers. Both are fully illustrated, and both give adequate descriptions of the products. Bostitch.

–66–

STRAPPING—Colorful poster reminds strappers that safe arrival of shipments at the fighting front is all-important. Five starred points for better strapping are listed. "Strap them right—help win the fight" is the slogan. Acme Steel Co.

–67–

SURFACE TREATMENT—of stainless steel is discussed in 3-page special service report. Subjects considered include machining, rough and finish grinding, and the simplification of surface preparation by specialized descaling and degreasing materials. Oakite Products, Inc.

–68–

SWITCHGEAR—for mercury-arc rectifier equipment is treated. 18-page Bulletin GEA-3898. Photographs and wiring diagrams are shown. Seven "Standard" switchgear equipments are described. General Electric Co.

–69–

TACHOMETERS—"Production Control Industrial Tachometers," 12-page catalog, gives general description, calibration, list of uses, and special applications. Tachometer drive equipment is also shown. Stewart-Warner Corp.

–70–

TANK CALCULATOR—For users of ASME Code pressure vessels. Works on slide-rule principle to give pertinent data on 75-, 100-, 125-, and 150-lb. welded tanks. Buffalo Tank Corp.

–71–

TAPPING MACHINES—Catalog deals with No. 2 tapping machine which is designed for the tapping of holes from 1/9 to 2½ inches in diameter. Features, parts, and accessories are described and pictured. Bakewell Mfg. Co.

–72–

TOOL MANUAL—vest-pocket size, ruggedly bound. Contains 52 pages of information on the care, handling, and most efficient methods of using Kennametal tools. More than 100 drawings illustrate applications, operation, styles, and instructions for grinding. McKenna Metals Co.

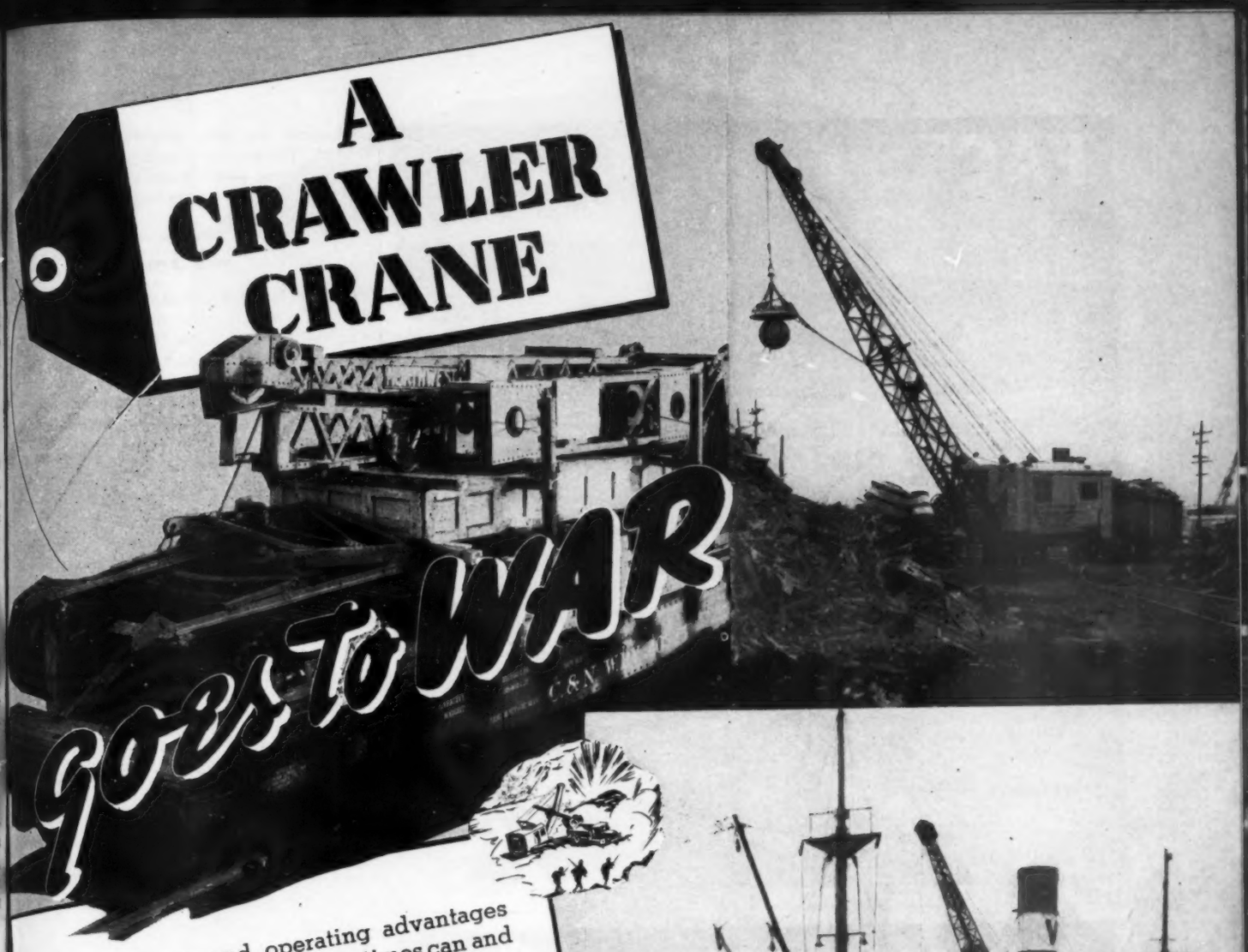
–73–

TOOTH SPROCKETS—Book 2067 lists all sizes of cast tooth sprocket wheels that are available from stock, and tabulates the sizes of wheels that have been most commonly ordered. Link-Belt Co.

–74–

TRANSFORMERS—Power and distribution transformers and other electrical distribution

A CRAWLER CRANE goes to WAR



THE design and operating advantages that made money in peace times can and are helping to speed defense in war times. And in reverse, the performance of machinery in war times can teach a lesson to peace time operators.

Take Northwest for instance—Northwest simplicity—few shafts, few gears, simple arrangement! This means easier assembly in far away ports, easier upkeep—easier understanding on the part of green men! There is a time coming when you will be able to get Northwest again! When that time comes, the competitive angle is going to be a little tougher.

Northwest simplicity and ease of upkeep is only one of the many features Northwest will have for you that will simplify future material handling problems.

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CGS Portable Reference Recorders capture and record facts directly, so that they may be recalled at will. A full hour of conversation may be recorded on one side of a paper-thin plastic disc at a cost of only a few cents. The information may be transcribed into the written word, or the discs may be filed like letters and played back ten years hence.

CGS Recorders are mostly channeled to the Army, Navy and Air Forces, but a limited number are available under proper priorities for war plants.

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2-Way Wire Line Conversations
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Personnel Interviews
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P. A. Broadcasting
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Today, one type of EWC Trailer is hauling hay to a stock yard, while another type is handling armour-plate for tanks.

No matter what materials you handle, EWC Engineers can help reduce your handling time and increase your handling efficiency!

The complete EWC Trailer Line—with its innumerable variations—provides the proper hauling equipment for floor, yard, interplant, or street; in any capacity desired and with any type of body.

WRITE FOR BULLETINS, Prices and Helpful Suggestions applying to your specific handling problems.

EWC TRAILERS

ELECTRIC WHEEL CO.

DEPT. FA QUINCY, ILL.

equipment are fully described in Bulletin B-6186. Electro-cooler and unit substations for simplifying power control and distribution are two new developments treated. Allis-Chalmers Mfg. Co.

–75–

TRANSFORMERS—Bulletin 149 describes the Powerstat and the many uses that are claimed for it. Various types are pictured; circuits, ratings, line voltage correction, and general information are included. Also Bulletin 163, which discusses automatic voltage regulator and lists applications, together with ratings and features. Superior Electric Co.

–76–

TURBINES—Bulletin GEA-1145-D is devoted to Type D mechanical drive turbines, showing where they should be used, giving general specifications detailing construction features, and including schematic drawings. General Electric Co.

–77–

TURRET LATHES—Facts to help in selecting turret lathes. A study of the questions and answers in this book should prove valuable in determining the earning power of any turret lathe equipment. Well illustrated and practical. Jones & Lamson Machine Co.

–78–

V-BELTS—Catalog and instruction manual shows the sequence of operations to take apart the Veelos adjustable V-belting at any point with a screwdriver, and how to couple the belt together again without tools; also how to install the belt on the drive. Typical applications are illustrated, engineering data, and a sample calculation for determining size are included. Manheim Mfg. & Belting Co.

–79–

VOLTAGE STABILIZER—Automatic voltage stabilizer gives constant output voltage with variable input voltage, according to Bulletin GEA-3634. Eight pages are devoted to pictures, descriptions, standard ratings and data, and special ratings. General Electric Co.

–80–

WELDING—"How to Get the Most From Arc Welding" is theme of 42-page booklet that contains information concerning specific phases of arc welding such as "Factors Affecting Speed and Cost," "Justifying the Amount of Equipment for Fit-Up," "Where, When, and How to Weave." Lincoln Electric Co.

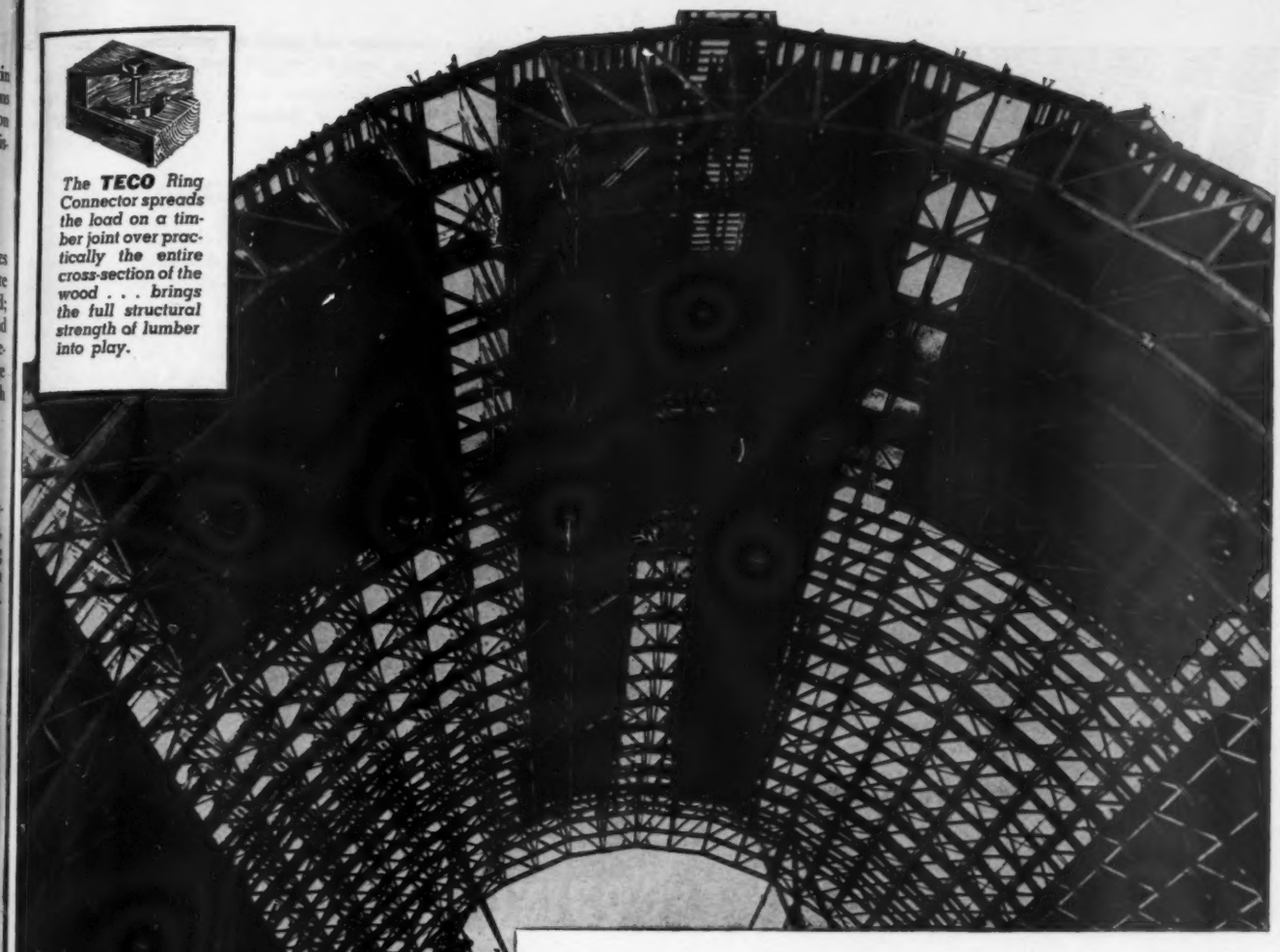
–81–

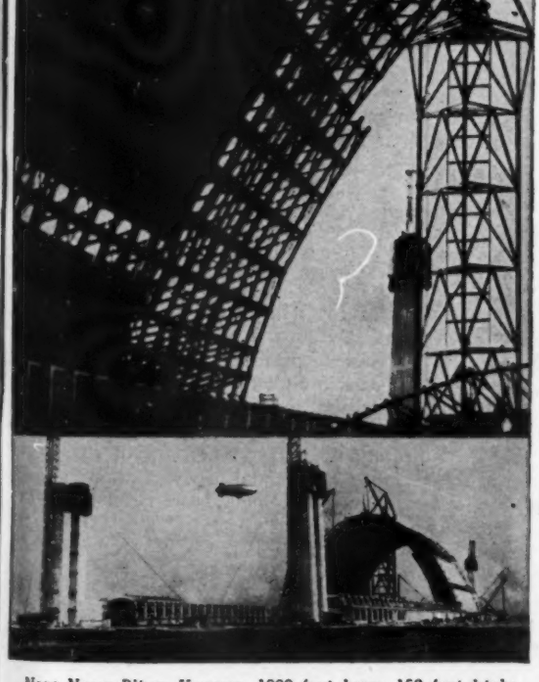
WELDING—Oxyacetylene Flame Adjustment Color Chart in natural color photography, gives student an accurate guide for adjusting flame. "The Welding of Piping" gives instructions on how to weld various types of pipe. Air Reduction Co.

–82–

WELDING—and brazing aluminum. A booklet of 100 pages designed to help conserve

The **TECO** *Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*





New Navy Blimp Hangar, 1000 feet long; 153 feet high; clear-span roof 237 feet. Timber treated for fire resistance according to Federal specifications. Trusses prefabricated by Timber Structures, Inc., Portland, Oregon.

OUR NAVY BUILDS WORLD'S GREATEST TIMBER STRUCTURE

mammoth blimp hangar was made possible by

TECO CONNECTOR ENGINEERING

Two announcements of the widest import to American engineering have just come out of Washington.

The U. S. Navy has announced that a giant blimp hangar, engineered entirely in timber, is nearing completion "somewhere in the continental United States."

The War Production Board has announced that "such a structure could not have been built of wood by ordinary methods without the use of timber connectors . . . The steel ring timber connector, which is used to increase the strength of joints in wood construction, saved more than 400,000 tons of steel for essential war production in 1942." WPB added that 2,050 tons of structural steel will be saved in this hangar alone.

In erecting this vast, multiple-truss assembly, Navy engineers have accomplished a notable achievement in modern timber connector engineering. The hangar is the latest of scores of large Navy, Army, and Maritime Commission projects built with Teco timber connectors under the revolutionary Teco system of timber engineering. It is one of *over 100,000* heavy-duty structures, of *over 600* types, built under the Teco connector system in the past few years. They include clear-span factories, bridges and trestles, towers, tanks, warehouses, docks, shipyards, and many others.

Write today for our FREE Reference Book for engineers and architects showing 45 *"Typical Designs of Timber Structures."*

TIMBER ENGINEERING COMPANY

NATIONAL MANUFACTURERS OF **TECO** TIMBER CONNECTORS AND TOOLS

WASHINGTON, D. C. PORTLAND, OREGON

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LIGHT . . STRONG . . SAFE FLOORING
About 85% of the area of Kerlow Open Steel Flooring is open . . . allowing free passage of light, air, heat and fumes, and making it self-clearing. And Kerlow Flooring is strong, slip-proof in all directions, easily installed, and wear-resisting . . . the ideal industrial flooring.
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WRAP WAR PARTS WITH
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PAPER PROTECTS
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SPECIALTY PAPERS
BUY U. S.
WAR
BONDS
Deterioration of war parts from corrosion, moisture and vapor obstructs Victory—Central has a complete line of protective papers for large parts and small.
Let Central solve your wrapping and packing problems—and don't forget Central's laboratory designed industrial papers.
CENTRAL PAPER COMPANY, INC.
MICHIGAN UNITED, WATERPROOF DIVISION
MUSKEGON, MICHIGAN

aluminum and speed up production. It explains how to use and work the metal correctly, eliminate waste and scrap losses, and reduce tool breakage. Aluminum Co. of America.

–83–

WELDING—New development in refrigerated welding electrode design is announced in four-color Bulletin P-43. Construction and operation of Frostpoint permanent electrodes with replaceable finned Frostcaps are described. Also shown are Frostpoint adapter holders for converting spot welders to the process. Color cuts show coolant circulation, improved installation practice, and method of cap replacement with electric pliers. Frostrode Products.

–84–

WELDING POSITIONER—Four-page pamphlet shows hydraulically operated welding positioner used with different types of units, and how it tilts, lifts, revolves. Back page of pamphlet is devoted to elevating welding tables and foot pumps. Lyon-Raymond Corp.

–85–

WIRING—Manual on wiring for under-floor electrical distribution in cellular steel Q-floors includes catalog listing of wiring accessories and fittings and detailed data on layout and installation procedure. General Electric Co.

–86–

WOOD LOCKERS—Wood lockers that look like steel, using non-critical materials, are described in special 4-page bulletin. Designed to meet the requirements of war production plants, this bulletin illustrates single tier or full length, double tier and box type lockers. Full specifications and dimensions, colors are included. Colonial Furniture Co.

–87–

WOOD PRODUCTS—Cabinets, shoprobes, lockers, and shelving, being engineered in wood instead of metal for the duration, are illustrated in Bulletin 1705. Complete specifications and construction details are shown. Bulletin 33-F gives 40 pages of diagrams, illustrations, and specifications of steel lockers, shop equipment, steelart shelving, and vocational equipment. Lyon Metal Products, Inc.

–88–

"WORK-LITE UNITS"—Catalog 102, illustrates and describes various types of adjustable work lights. Diagrams show construction and dimensions. Are for attachment to machines, walls, ceilings, tables. Applications illustrated. Reliance Devices Co., Inc.

–89–

WORM GEAR—units for 3- and 3½-in. center drive distances are described in Leaflet E-1219. Top and bottom drive units are pictured, specifications listed, schematic drawings shown. De Laval Steam Turbine Co.

Engineering

FACTORY

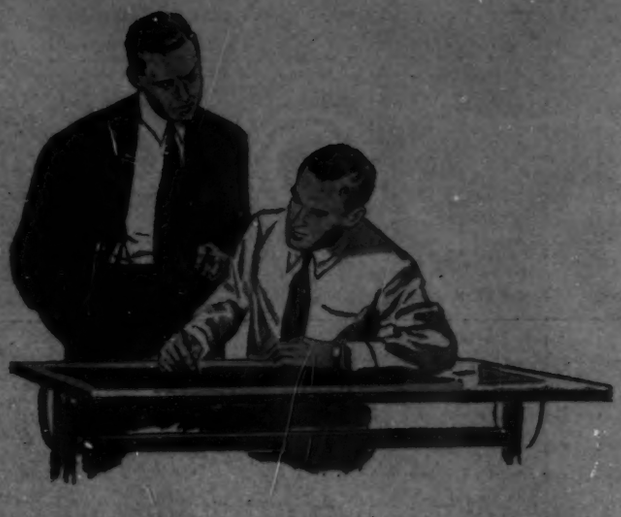
MANAGEMENT AND MAINTENANCE

A McGRAW-HILL PUBLICATION

JUNE 1943

The Coming Labor Upheaval . . . page 82

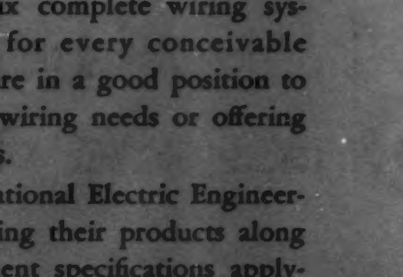
An Electrical System for any requirement



Because of their ability to meet the constantly changing requirements of the industry, National Electric have long been recognized the accepted "standard" of the trade.

Manufacturing six complete wiring systems and fittings for every conceivable requirement, they are in a good position to service your exact wiring needs or offering war-time substitutes.

Write for the National Electric Engineering Data Book listing their products along with the Government specifications applying thereto.



National Electric Products Corporation
Pittsburgh, Pa.

Sherarduct—Rustproofed Rigid Steel Condu

Economy—Black Enameled Rigid Steel Conduit

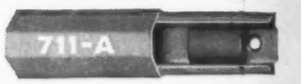
Sherarduct Jr.—Rustproofed Electrical Metallic Tub

I. F. B.—Industrial Feeder and **I. P. I.**—"Plug-in" B

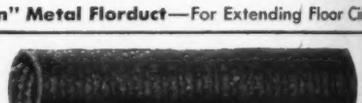
Ovalduct—Rigid Oval Underplaster Race

"La-in" Metal Molding—4-Wire Surface Raceway

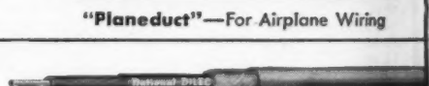
"La-in" Metal Xtensionduct—2-Wire Surface Rac



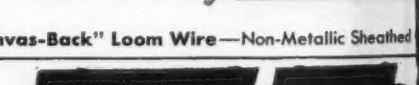
"La-in" Metal Florduct—For Extending Floor Circ



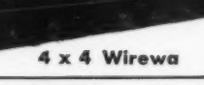
"Planeduct"—For Airplane Wiring



"Canvas-Back" Loom Wire—Non-Metallic Sheathed

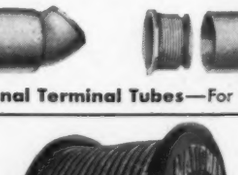


4 x 4 Wirewa

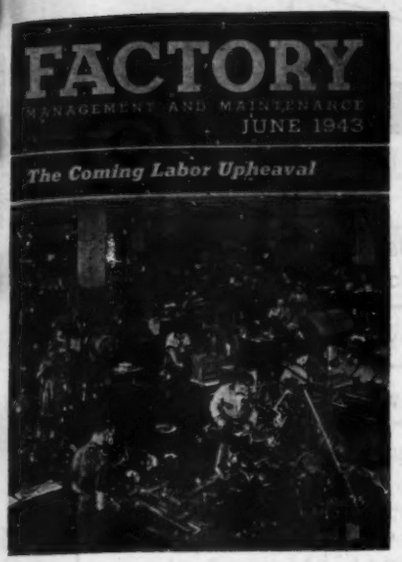


"Gorilla Grip" Connectors—Mechanical Pressure Conn

National Terminal Tubes—For Vessels



"Rub-r-Less" Wires and Cables—No Rubber—No



On the cover, main machine shop in Woodward Governor Company's ultra-modern plant, Rockford, Ill. Who wouldn't want to work here? Ceiling, perforated metal acoustic tile, suspended so that it is possible to service lighting units and air conditioning duct work from above. Floor, terrazzo, with non-slip surface. Kodachrome made by the Rockford Illustrating Company.

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